DECEMBER 31, 1951

Electrical World

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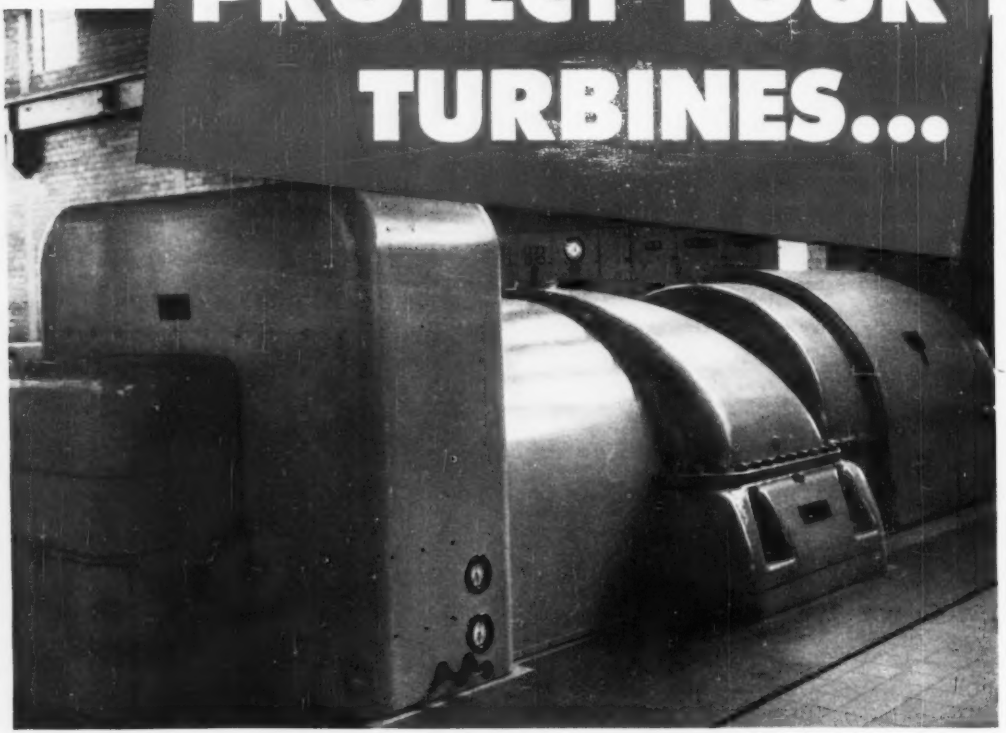

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IT MAKES no difference what the size of your turbines . . . or whether they're steam or hydro. *You can't buy better lubrication than Texaco Regal Oil (R&O)!*

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Beginning January 7

★

When you see your copy of Electrical World of January 7 we think you'll agree with us that it's another giant step forward in Electrical World's long history. In its 29 editorial pages it will give you even faster, more complete, and better coverage of news and engineering development in the electrical industry.

★

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- ★ All-Industry Statistics
- ★ Industry News In Pictures
- ★ More Engineering News
- ★ Industry Meeting Programs
- ★ News of Sales Activities
- ★ Finance, Regulation and Rates
- ★ Industrial Relations News

★

Electrical World

Published for 77 years for those engaged in the business of generating, transmitting, distributing or applying electric power

Vol. 136 No. 27 — December 31, 1951

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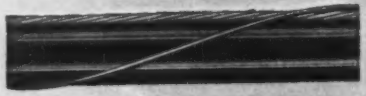
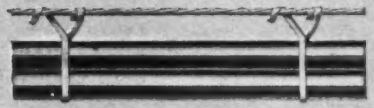
with stormsafe *OKOLITE-OKOPRENE* aerial cables

Okolite-Okoprene *Self-Supporting* Aerial Cable with in-built messenger. Made with Dualay* design for easy lapping.



Okolite-Okoprene cables can be lashed to messenger by *spinner method.*

*In the Dualay method (U.S. Pat. 2,430,378) the insulated conductors are twisted together so that the direction of lay is reversed at regular short intervals to permit conductor separation without cutting the copper or performing any operation on the messenger.



Okolite-Okoprene cables may be installed in regular messenger rings.

▶ Ice storms, hurricane winds, flooding rains, power lines down – *but not out.* Every season of the year brings further evidence on the greater freedom from outages and service interruptions when long-lived, dependable Okolite-Okoprene aerial cables are used. Their time-proven components – a tough weather resistant Okoprene sheath, permanently bonded to dense, moisture resistant, high voltage Okolite insulation – and strong mechanical designs give superior protection against wind, icing and moisture.

But storm resistance is only one of the many advantages of Okonite aerial cables. Whether self-supporting, ring-supported or spinner-lashed, they provide the sound values of reasonable first cost, low installation and maintenance costs. Their lower reactance gives improved circuit regulation and lower voltage drop. Neat and compact, they save space, eliminate cross-arms and congestion on poles, greatly reduce or even make tree trimming unnecessary. And they afford greater protection to linemen, public safety and property.

Generally recognized for their advantages on primary circuits, Okonite cables of this economical design are being used more and more for street lighting circuits, for secondaries – including networks – and for service drops. In addition to their suitability for utility overhead systems, Okonite aerial cables are extensively used by industrial plants and railroads for power, lighting, communication and control systems. Details on the many types available, with complete data on selection and installation, are combined in Bulletin EW-1058. Just write The Okonite Company, Passaic, N. J.

THE BEST CABLE IS YOUR BEST POLICY

OKONITE SINCE 1878 *insulated wires and cables*

7942

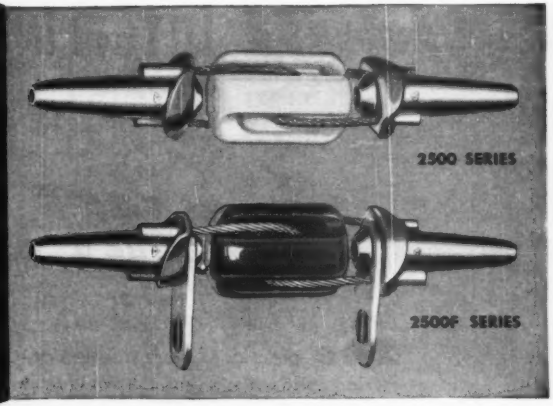
for the largest number of line applications at the lowest possible cost...

USE

Electroline

Insulating
Automatic
Line Splice

SECTIONALIZERS



The Electroline Sectionalizers are assemblies that will function in service as most convenient, reliable and yet low cost interrupting devices. Series 2500-F and 2600 provide for paralleling with a fuse element for further protection when sectionalizing. The mechanical strength of these assemblies exceeds in all cases the rated breaking strength of the conductor for which they are adapted.

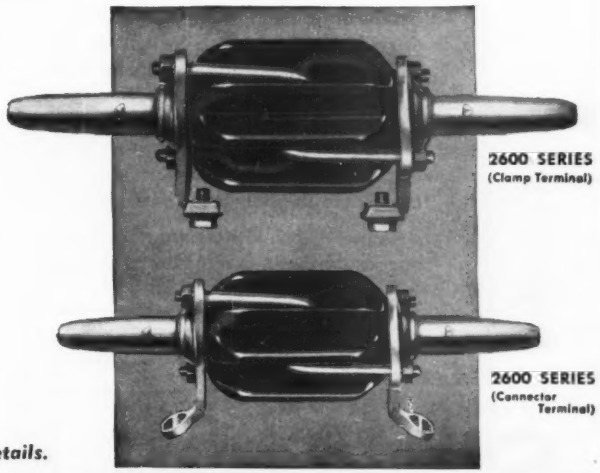
These Insulating Automatic Line Splice Sectionalizers are ideal for:

Installing Regulating Equipment,
simplifies cutting-in disconnecting points, fuses, voltage regulators and series capacitors;

Restoring Service,
providing points to test for trouble;

Sectionalizing Networks,
to readily isolate and test the area in trouble;

Series Street Lighting,
simplifies cutting-in series street lamps—merely cut the line and insert conductor ends into sectionalizer.



Send for Bulletins containing complete details.

Electroline Company

4121 South La Salle Street • Chicago 9, Illinois

In Canada: POWERLITE DEVICES, LTD., TORONTO

Alduti Interrupter Switches

PERMIT ARC-FREE

The practice of mounting sectionalizing switches upright to provide arc clearance is often inconvenient and costly. This is especially true where a vertical conductor configuration is used. In this case, the transposition of conductors into the horizontal plane for pole top switching requires a longer span and a higher pole; and the wide spacing demanded by horn gap switches often results in a costly supporting structure.

On the other hand, with the installation of an Alduti Interrupter Switch vertical conductor configuration, regular span lengths and regular pole height can be retained. In many cases the installation can be made on an existing line pole, and no switch supporting structure other than the pole itself is needed.

Because Alduti Interrupter Switches operate without external arcing there is no limitation imposed on line design to provide arcing clearance for switches. Switch configuration can conform to the configuration of the line. This opens the door to development of "unconventional" improvements in switch mounting techniques, of which the illustration is a typical example.

Yet these structural advantages are but part of the story. With interrupter switches you are no longer restricted to present sectionalizing practices. Feeders and branch lines can now be safely switched without sequencing with breakers or dropping individual loads —because Alduti Interrupter Switches interrupt not only line or cable charging currents, but also 600 amperes of load current.

Why not discuss with your S&C sales representative the advantages of this new kind of sectionalizing switching.

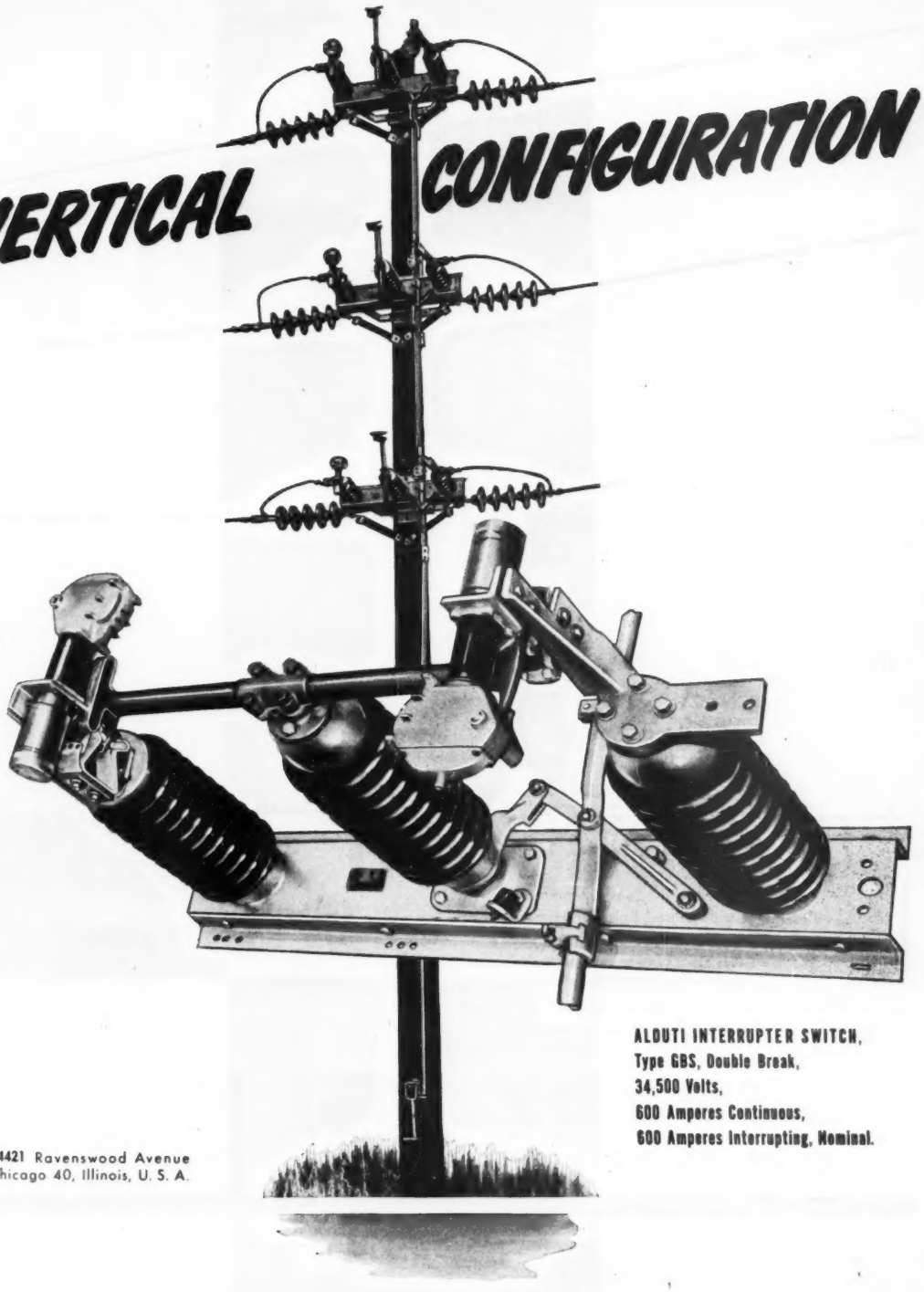
Alduti Interrupter Switches are supplied in the following ratings:

Volts	Amperes Continuous	Amperes Interrupting, Nominal
For hook stick or group operation		
7500 & 15000	400, 600, 1200	400, 600
For group operation only		
23000 & 34500	600	600

S&C ELECTRIC COMPANY

Formerly SCHWEITZER & CONRAD, INC. — In Canada, Powerlite Devices, Limited, Toronto

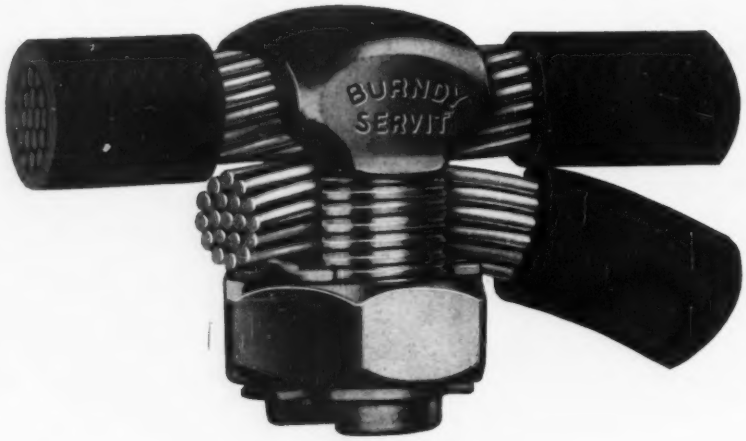
VERTICAL CONFIGURATION



ALDUTI INTERRUPTER SWITCH,
Type GBS, Double Break,
34,500 Volts,
600 Amperes Continuous,
600 Amperes Interrupting, Nominal.

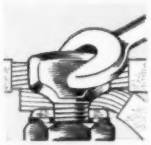
4421 Ravenswood Avenue
Chicago 40, Illinois, U. S. A.

BURNDY-BUILT *to do an important job* BETTER

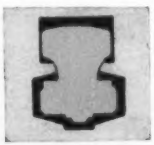


Comparison of Burndy Servit with other makes, reveals some striking advantages. The longer Servit head is easier to hold with a wrench. The pressure bar equals the length of the head and contributes much to Servit's higher pull-out strength. Servit is forged from high-strength silicon bronze alloy to afford exceptional durability without bulk. Furthermore, all Servits will give good results in service. Strict quality control on daily production runs keep Servit performance characteristics at a uniformly high level.

MORE CONVENIENT! — Won't stick up like sore thumb! Easier wrench grip!



SMALLER! — Servit shown against another split-bolt of comparable size.



BURNDY SERVIT

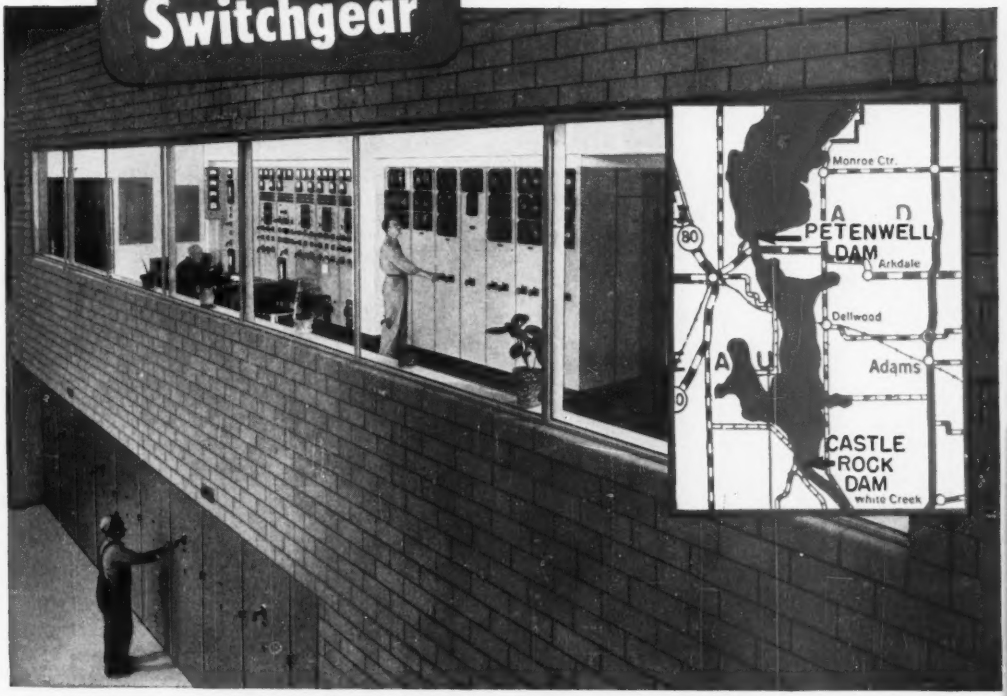
STRONGER! — Head and pressure bar of equal length — bar resists crushing!

TIGHTER! — Maximum tightening force transmitted into intimate contact between conductors.

BURNDY, New York 54, N. Y.
Western Branch: Vernon 58, Calif.
Burndy Canada Ltd., Toronto 8, Ontario

ALLIS-CHALMERS

Switchgear



Switchgear and 15-kv air-blast switchgear for four 5000-kw generators at Petenwell.

Protects 177,000,000 kwh

Ruptair magnetic air circuit breakers are used in 4.16-kv switchgear for five 3000-kw generators at Castle Rock.

PROTECTION of both the generation and transmission of an estimated 177,000,000 kwh a year. That's the job recently taken on by Allis-Chalmers switchgear at the new Petenwell and Castle Rock hydroelectric plants on the Wisconsin river.

Each plant has an Allis-Chalmers duplex control board for convenient centralized control of the generators, low-voltage switchgear for station service, and high-voltage switchgear for fully protected power transmission.

These installations show how readily factory-built switchgear can be fitted into a specific installation — both electrically and architecturally.

Your nearby Allis-Chalmers representative can supply you with construction details. And he is always ready to provide experienced engineering assistance to help you fill your switchgear requirements. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3503

Ruptair is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Facts from
NEW HAMPSHIRE
HOTEL

"8 Outages a month cut to zero with 'CSP®' Transformer"

"Until three years ago, we were having considerable transformer trouble due to lightning. 'CSP' Transformers proved to be our solution," reports a New Hampshire Utility.

"One particularly troublesome 2,400-volt conventional transformer required re-fusing about twice a week during the lightning season. We tried interconnecting it, fused it for 10 amperes, and improved the ground with two extra No. 2 copper ground rods. Outages continued. One time the lightning arresters were actually blown up. We installed a 'CSP' Transformer, without any change in the existing ground, and no outages have been experienced since."

Installation and maintenance costs for "CSP" (Completely Self-Protecting) Transformers are always lower, because complete protective equipment is built in, not separately mounted. A two-year survey of Electric Light and Power Companies shows the following:

NATIONAL AVERAGES

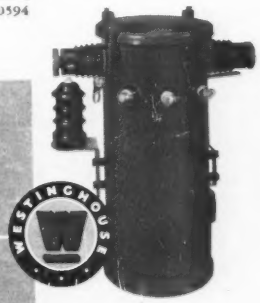
	"CSP"	Conventional
Installation Costs	$13.87	$24.74
Burn-out Rate	0.257%	1.005%
Fuse Outages	None	5.64% (at $6.52 per outage)
Load Checks	Automatic	12.8%
Breaker Reset	1.02%	None

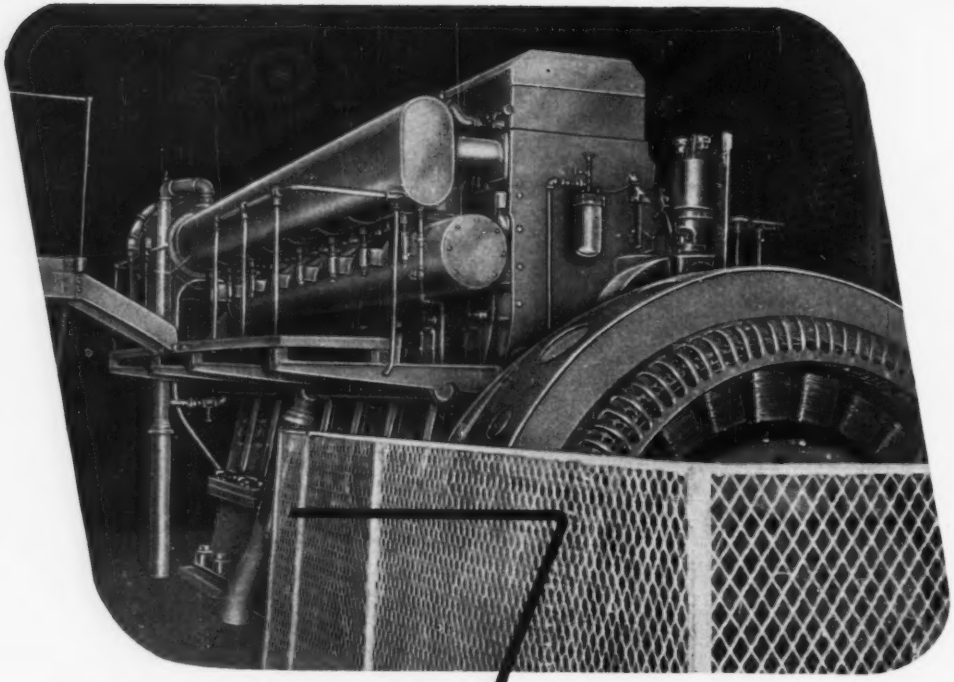
If you'd like to check your own costs against these national averages, ask your Westinghouse representative for Booklet B-4247-B, "Transformer Costs and Their Relation to Profits". Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70594

YOU CAN BE SURE.. IF IT'S

Westinghouse

"CSP" DISTRIBUTION TRANSFORMERS





1500 H. P. Elliott Turbocharged CP Diesel installed in a midwestern utility plant.

CHICAGO PNEUMATIC heavy duty, medium and slow speed DIESEL ENGINES

Whatever may be your horsepower requirements, there is a Chicago Pneumatic Diesel engine that will meet your needs. Available in sizes ranging from 120 H.P. to 1750 H.P., these engines can be furnished either for straight Diesel or for Dual Fuel operation.

The CP engine line includes both normally aspirated and supercharged engines. All supercharged engines incorporate the thoroughly dependable Elliott Turbocharger.

Years of reliable performance and low cost power have won for Chicago Pneumatic an outstanding position in the Diesel field.

CP Diesels have proved profitable investments for public utilities, industrial, municipal, ice and water-works plants, and in mining, oil, pipeline, cotton ginning and other fields where low cost, dependable power is a vital necessity.

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ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

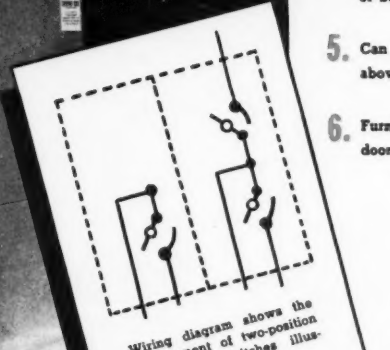
Increase SAFETY FACTORS at Load Centers with

R&IE INTERRUPTER SWITCHES

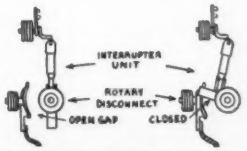
5 Kv., 600 Ampere wall-mounted Interrupter Switch used to transfer load without interruption. Housing at left—single switch; housing at right—two single throw switches, all hook operated.

CHECK the FACTS

1. Compact, easy to install, mounts anywhere—wall, transformer throat, etc.
2. Reliable load interrupter and open gap switch assembly, single or double throw.
3. Operating handle equipped with sequencing device to prevent opening of switch before it is fully closed. This guarantees proper interrupting operation.
4. Can be equipped with Kirk Key Interlock or Solenoid type system.
5. Can be arranged for fuse combinations above or below interrupter.
6. Furnished with or without housings—doors can be interlocked.



Wiring diagram shows the arrangement of two-position three pole switches illustrated above.



Plunger type interrupter quenches the arc when plunger is quickly drawn into a fibre lined tube. The two electrodes separate and arc is extinguished in the narrow space, causing interruption. Rotary disconnect establishes visible open gap.

The Check List

- CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS
- DISCONNECTING SWITCHES INDOOR AND OUTDOOR
- HORN GAP SWITCHES
- INTERRUPTER SWITCHES
- CUTOUTS AND THERMO-RUPTERS
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- TESTING DEVICES

RAILWAY and INDUSTRIAL ENGINEERING CO., Greensburg, Pa.

IN CANADA—EASTERN POWER DEVICES LIMITED, TORONTO

AN I-T-E SUBSIDIARY

HELPING TO POWER THE KEYSTONE TO
BALDWIN-

SEATTLE'S GREAT HYDRO-ELECTRIC PROJECT

Baldwin Turbines

The 540-foot Ross Dam, fourth highest structure of its kind in the world, is the key structure in Seattle's Mammoth Skagit project that provides most of the municipality's electric power . . . and that also controls the disastrous floods that once swept the valley.

Three Baldwin turbines, each rated at 120,000 hp with runners designed for 355 feet effective head will be installed soon, adding 270,000 kw to the city's available power supply. A fourth unit is scheduled for installation later. When the height of the dam is raised an additional 125 feet, runners adapted to 440 feet will be installed, boosting the capacity of each unit to 140,000 hp. The view at left is typical of the 178 inch, 53 ton Baldwin Francis-type turbine runners that will be installed.

★ ★ ★

Baldwin has four valuable assets to offer to any group concerned with hydro-electric development.

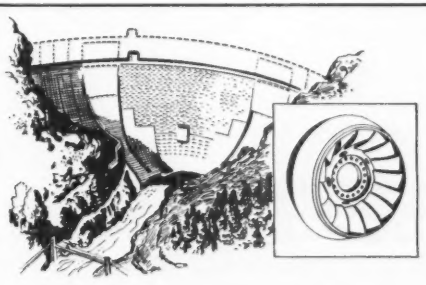
. . . A wealth of experience that covers every type of hydro project—plus a pioneering spirit that has repeatedly demonstrated that so-called "impossible" jobs *can be done.*

. . . A complete range of available capacities, that includes everything from small, fractional-horse power water wheels up to the largest units that can be shipped.

. . . A line that includes all four basic types of turbines—Impulse, Propeller, Francis, and Kaplan (adjustable blade). This permits unbiased selection of the type best suited to any head and flow condition.

. . . A complete line of valves, and other hydraulic machinery designed to function perfectly with the turbine units.

We will welcome an opportunity to discuss your project with you.



DESIGNED FOR FUTURE GROWTH

With an eye to the future, engineers designed the great Ross Dam for later growth. Ultimately, the height to the roadway will be raised to 665 feet, forming a lake 30 miles long with storage area of 3,450,000 acre-feet. Baldwin "know-how" will be utilized to design new turbine runners, no larger than the present ones, but adapted to the ultimate 440 foot effective head.

EDDYSTONE DIVISION
BALDWIN-LIMA-HAMILTON CORPORATION
Philadelphia 42, Pa.

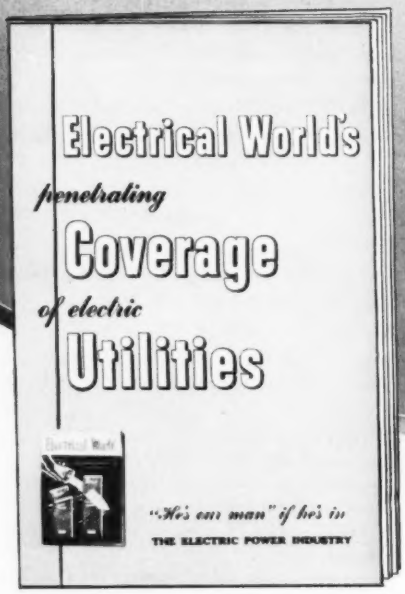
PELTON WATER WHEEL COMPANY
2929 Nineteenth St., San Francisco 10, Calif.

BALDWIN BLH LIMA-HAMILTON

LIMA-HAMILTON

If you have anything America's biggest

—These two booklets



Again in 1952, the electric utilities will spend more than any other industry for capital goods – 3.4 billion dollars.

Even so, the utilities, in themselves, do not comprise *all* of the electric power industry.

Electrical installations in big industry are a big market, too.

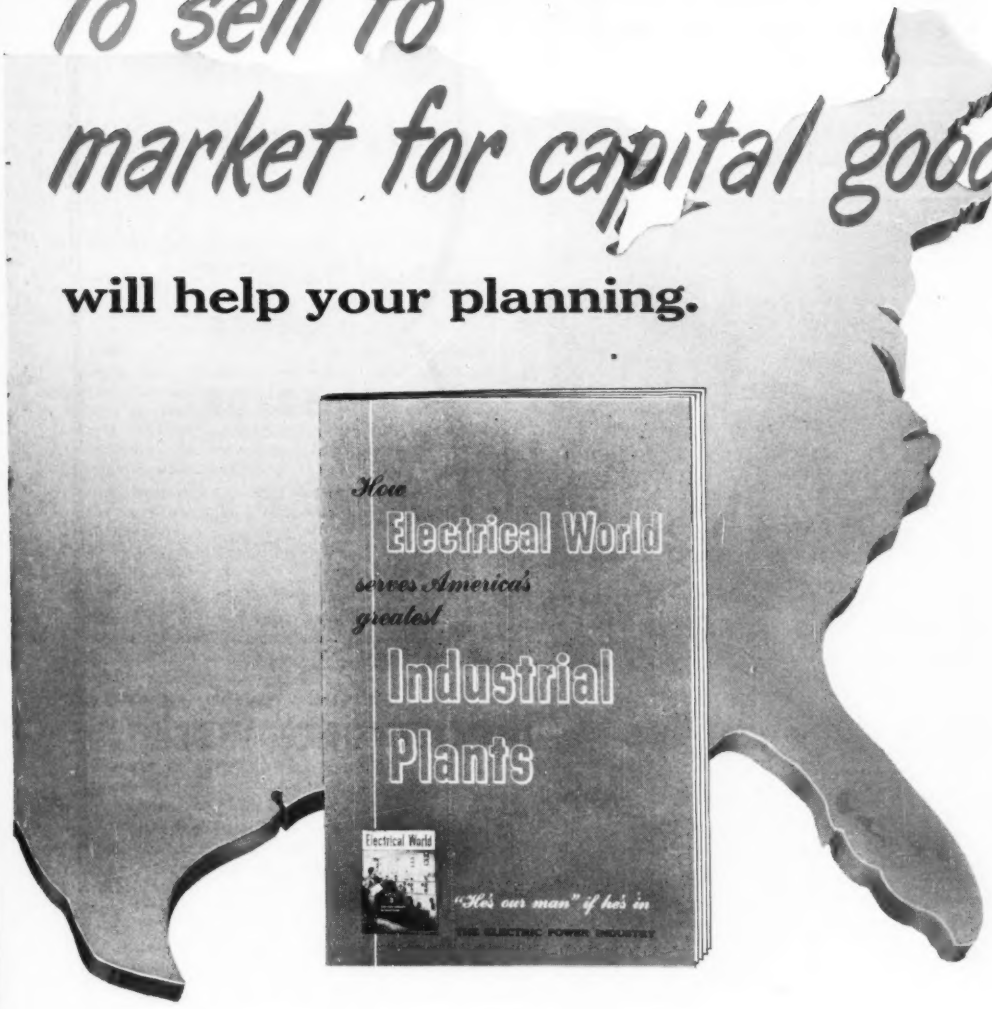
These two books give you, briefly and clearly, the dimensions and potential of 1) THE ELECTRIC UTILITIES (public and private) and 2) Electrical installations of industry. They show you how and why you can reach, influence and sell them through Electrical World, more thoroughly and economically than through any other medium.

Yes, if you have *anything* to sell to the electric power industry, you'll find these booklets helpful. And we've underlined *anything* because the electric power industry is so big, and growing so fast – it's worth selling as a market for anything a big, booming industry can use – anything from office machines to bulldozers.

We'd be glad to send you copies of each booklet. A request on your business letterhead will bring them promptly.

to sell to market for capital goods

will help your planning.



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BEST EQUIPMENT

CAREFUL WORK

PROMPT SERVICE

ECONOMY

FULL RESPONSIBILITY

remember these seven

when planning your line clearance work

BARTLETT
TREE EXPERTS
The Bartlett Way

These seven advantages of Bartlett line clearance service make life easier for public utilities from Maine to the Carolinas and west to Indiana. They assure the best in work; and they maintain good public relations. Home owners *know* the name Bartlett and the fine work it stands for. They know Bartlett respects fine trees and will protect them when clearing lines.

HOME OFFICE, RESEARCH LABORATORIES & EXPERIMENTAL GROUNDS, STAMFORD, CONN.

LOCAL OFFICES: Rutland, Windsor, Vt.; Milford, Peterboro, Rochester, N. H.; Cambridge, Framingham, Manchester, Osterville, Pittsfield, Mass.; Providence, R. I.; Danbury, Hartford, New Canaan, New Haven, Stamford, Westport, Conn.; Delhi, Garnerville, Islip, Kingston, Monroe, Middletown, New York, Peekskill, Southampton, Syracuse, Westbury, White Plains, Yorktown Heights, N. Y.; Bernardsville, Morristown, Orange, N. J.; Chambersburg, Paoli, Philadelphia (Cynwyd), York, Pa.; Wilmington, Del.; Bethesda, Easton, Towson, Md.; Ashland, Ky.; Lancaster, Portsmouth, Ohio; Charlottesville, Lynchburg, Roanoke, Va.; Bluefield, Charleston, Huntington, W. Va.; Kingsport, Tenn.

You can profit

from Manchester's Experience

Quick, Easy Expansion with Westinghouse Network Transformers

Public Service Company of New Hampshire envisioned Manchester as a city sure to grow . . . power requirements certain to increase. That's why an underground secondary network system was installed . . . to give the flexibility needed to accommodate extensions, load shifts and future growth *economically.*

Already these predictions have come true. But the network system offered a simple solution. A number of new 500-kva Westinghouse Network Transformers were quickly and easily installed throughout the city.

Here's the transformer that offers greater savings in initial cost . . . and these *plus* features:

STANDARDIZED electrically and mechanically to meet industry requirements . . . to improve delivery and reduce costs.

CONTINUOUS WINDINGS with sliverless copper.

HIGH AND LOW-VOLTAGE COILS accurately centered to minimize short-circuit stresses.

SINGLE RESPONSIBILITY—transformer, network protector, rotary switch all supplied by one manufacturer.

Westinghouse helped develop the network system over 29 years ago and has continuously pioneered new developments. Complete facilities including board analysis and competent engineers can help with your system planning. Call your nearest Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70614

YOU CAN BE SURE... IF IT'S

Westinghouse

NETWORK TRANSFORMERS

SCS SUBSTATION DESIGN

Simplifies Testing and Inspection!

POTENTIAL TRANSFORMERS AND CONTROL POWER TRANSFORMERS ARE ACCESSIBLE . . . DRAWOUT MOUNTED IN ALLIS-CHALMERS SCS SINGLE CIRCUIT UNIT SUBSTATIONS

AUXILIARY TRANSFORMERS are switchgear components. That's why they are drawout mounted in safe, metal enclosed compartments of the switchgear! They are easy to get at in SCS Single Circuit Unit Substations . . . not fixed mounted or sealed into the oil filled power transformer tank.

When specifying a single circuit unit substation for your distribution system, why accept less than the accessibility, safety and low cost maintenance possible with this arrangement?

This is how Allis-Chalmers drawout mounted potential and control power transformers simplify testing and inspection . . . cut maintenance costs . . . help give better customer service:

1. Potential transformers and control power transformers are physically separated from the power transformer. This isolation is an added assurance of service continuity.

2. Easy accessibility permits use of fuses in both primary and secondary circuits for more complete equipment protection.

3. Use of standard design makes replacement easy.

4. Personnel protection. Drawout mounted auxiliary transformers are "dead" when in position for inspection, testing or maintenance.

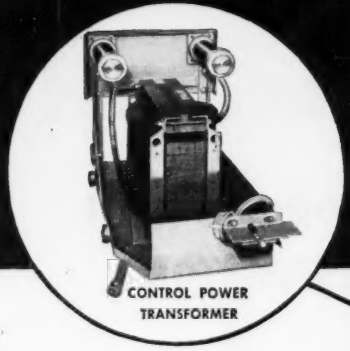
Allis-Chalmers SCS Single Circuit Unit Substations are modern appearing — can be fitted quickly into your distribution system.

A-3268

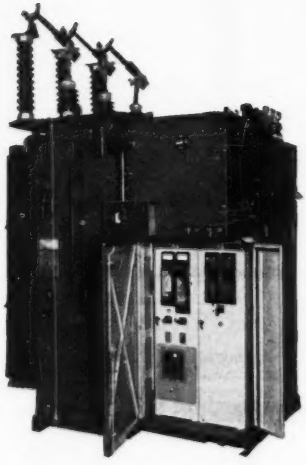
Pioneers in Load Ratio Control
Originators of 5/8% Step Regulators

ALLIS-

POTENTIAL TRANSFORMER



CONTROL POWER TRANSFORMER



What does this arrangement of Auxiliary Transformers mean to You?

1. *Easier Maintenance* because auxiliary transformers are located in the switchgear . . . not in the power transformer tank.

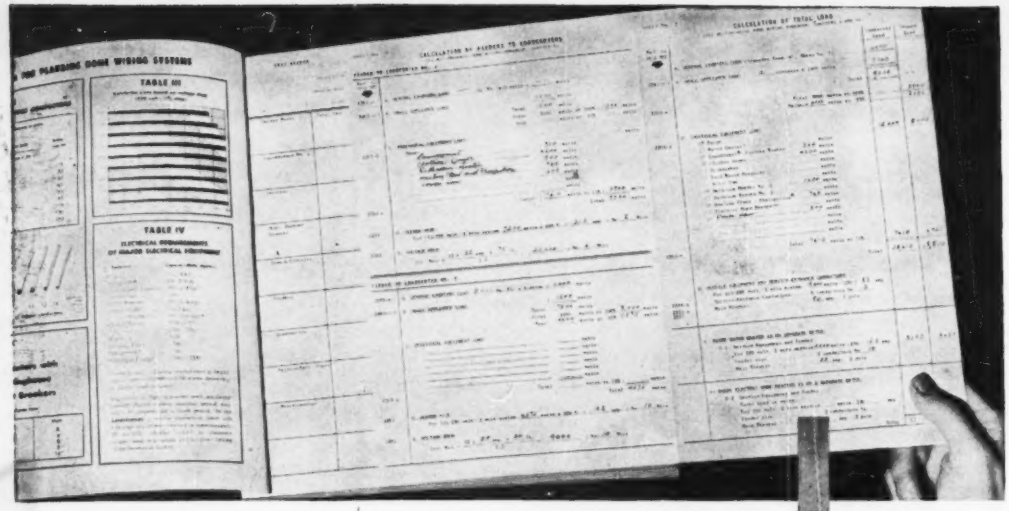
2. *Simplified Testing and Inspection* because the PT's and CPT's are very accessible on drawout mountings.

3. *Greater Safety* because they are disconnected from the line *automatically* when accessible for maintenance.

For more information, call your A-C Sales Office or write Allis-Chalmers, Milwaukee 1, Wisconsin for bulletin 11B7457.

CHALMERS

A-C ALLIS-CHALMERS



Give your adequate wiring program a lift with this *NEW* HOME WIRING ESTIMATOR

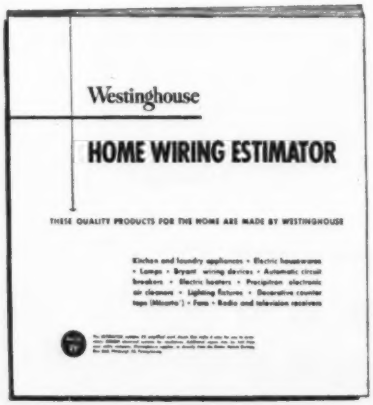
This is a new simplified timesaving way to compute adequate wiring systems for homes.

It enables a builder to more clearly specify his electrical requirements, resulting in bids based on comparable installation. Also helps electrical contractor make more accurate estimates . . . helps him show builders why adequate wiring systems require the number of circuits and outlets recommended.

Complete Promotion Package Available

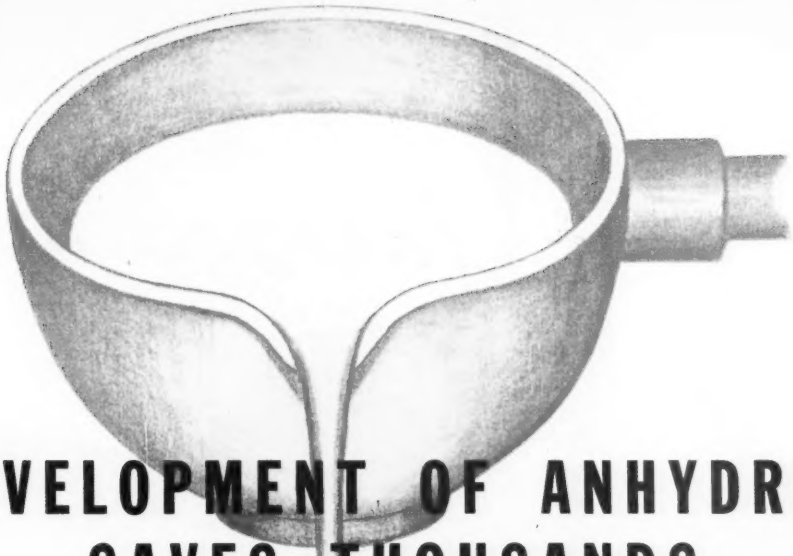
With the Estimator, we furnish you a complete package to help introduce it to the building industry and win its acceptance.

So that you may see for yourself how effective this plan can be, we will send one complete package FREE to you. It contains promotion plan and meeting guide. Send for your package today on your company letterhead. There is no charge. Better Homes Bureau, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. G-10186



YOU CAN BE SURE...IF IT'S

Westinghouse



DEVELOPMENT OF ANHYDREX SAVES THOUSANDS OF TONS OF LEAD

Research sometimes pays large and unexpected dividends. When Simplex was developing the first rubber-jacketed underground cable, our object was to eliminate the use of lead in order that you might have lighter cables, ones that were easier to install, and were very much easier to splice.

Now it appears that another dividend, unexpected but valuable nevertheless, has accrued from this research work. In fact, the development of the first rubber-jacketed underground cable has opened the door to enormous savings of one of our vital national resources.

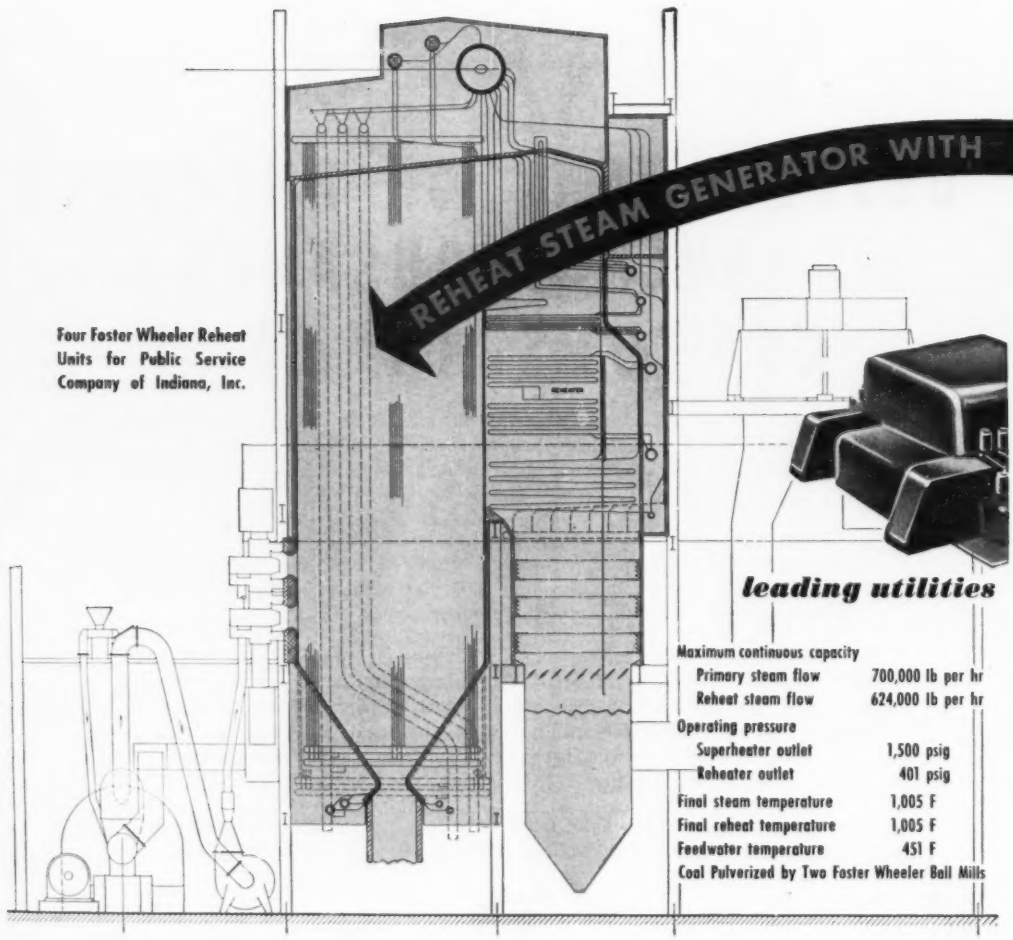
Today millions of feet of cables that without Simplex research would have required thousands of tons of lead for cable sheaths, are operating dependably in all types of jobs, from airport lighting to railway signaling. Instead of being used for cable sheaths this lead can now be used for much more important service for everything from storage battery plates to tetraethyl lead for gasoline.

ANHYDREX is only one of many improvements in the art of cable manufacture to come out of Simplex Research and Development Laboratories.

SIMPLEX ANHYDREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

Integrating

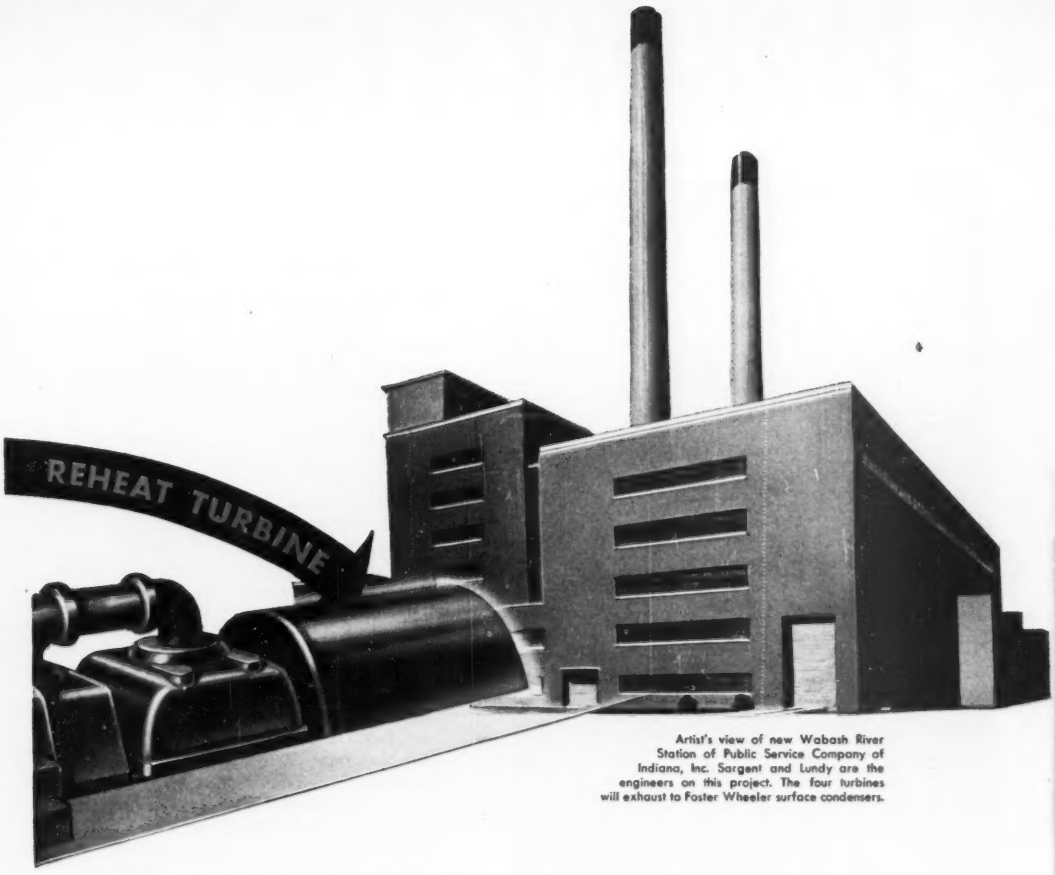


Four Foster Wheeler Reheat Units for Public Service Company of Indiana, Inc.

leading utilities

Maximum continuous capacity	
Primary steam flow	700,000 lb per hr
Reheat steam flow	624,000 lb per hr
Operating pressure	
Superheater outlet	1,500 psig
Reheater outlet	401 psig
Final steam temperature	1,005 F
Final reheat temperature	1,005 F
Feedwater temperature	451 F

Coal Pulverized by Two Foster Wheeler Ball Mills



Artist's view of new Wabash River Station of Public Service Company of Indiana, Inc. Sargent and Lundy are the engineers on this project. The four turbines will exhaust to Foster Wheeler surface condensers.

are ordering Foster Wheeler reheat steam generators

The large investment in present day power plant equipment dictates the careful selection of major components so as to avoid costly forced outages. Foster Wheeler engineers have always sought to refine the techniques of steam generation. They therefore took an early interest in the development of reheat where operating and control characteristics of the reheat boiler are integrated with those of the reheat turbine during every phase of service. Almost three decades ago, these engineers were responsible for the utilization of the characteristics of radiant and convection superheaters in series. Over "500 radiant superheater years" in one utility alone attest to the reliability of radiant surface for superheating.

The reheat steam generator illustrated is designed with a combination radiant and convection superheater and an all convection reheater. The chief advantages of this type of Foster Wheeler reheat steam generator may be listed as follows:

- complete freedom from furnace slagging is assured because furnace can be designed to suit fuel characteristics rather than reheat cycle duty requirements
- permissible wider selection of fuel of varying slagging characteristics
- location of the reheater deep in the convection zone assures safer metal temperatures during all starting, shutting down, and emergency operating conditions

This design also incorporates such features as:

- complete drainability of all superheating and reheating surfaces essential to quick and normal starts
- wide range of precise control of final steam temperature
- fully independent means of controlling primary and reheat steam temperatures.

These features provide for complete integrating of steam generating unit with turbine requirements under normal, quick start or emergency conditions.

FOSTER WHEELER CORPORATION • 165 BROADWAY, NEW YORK 6, N. Y.

FOSTER WHEELER

PARKWAY CABLE

Photo courtesy of Barber-Greene Company

For economical, direct-in-the-ground burial

YOU'LL CUT EXPENSE to the minimum by adopting Roebling Parkway Cable for distribution and general power supply circuits. This cable is buried directly in a shallow, economical trench... and assures you dependable, maintenance-free service year in, year out.

Roebling Parkway Cable is made in single and multiple conductor — solid or stranded — in a range from 600 to 5,000 volts. Furnished with metallic armor or non-metallic ROEPRENE sheath, depending upon the amount of physical protection required.

C. A. A. Approved for Airport Lighting

Roebling Type A cable for 600 volts, and Type B for 3,000 and 5,000 volts, pass all C.A.A. requirements for Specification No. L-824. Both types are made in single and multiple conductor construction. Type A has RP insulation; the insulation of Type B is ozone-resistant oil-base rubber.

Large quantities of Roebling's full line of electrical wires and cables are called for in the national rearmament program. The Roebling organization and distributors will always, however, give you the best service and deliveries within their power. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

Atlanta, 934 Avon Ave ★ ***Boston,*** 51 Sleeper St ★ ***Chicago,*** 5525 W. Roosevelt Rd ★ ***Cincinnati,*** 3253 Fredonia Ave ★ ***Cleveland,*** 701 St. Clair Ave, N.E. ★ ***Denver,*** 4801 Jackson St ★ ***Detroit,*** 915 Fisher Building ★ ***Houston,*** 6216 Navigation Blvd ★ ***Los Angeles,*** 216 S. Alameda St ★ ***New York,*** 19 Rector St ★ ***Odessa, Texas,*** 1920 E. 2nd St ★ ***Philadelphia,*** 230 Vine St ★ ***San Francisco,*** 1740 17th St ★ ***Seattle,*** 900 1st Ave, S. ★ ***Tulsa,*** 321 N. Cheyenne St ★ Export Sales Office, ***Trenton, N. J.***

for faster underground installations

New L-M Spacers

New L-M Base Spacer:

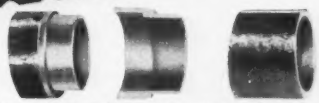
assures rigid foundation, desired gradient. Interlocking ends; wide flat base—the spacer will not tip over during or after installation. All L-M spacers come in standardized cartons to save stockroom handling and space. Available from stock, in six standard sizes.

New L-M Intermediate Spacer:

made of asphalt and asbestos fibre, highly resistant to acids and alkalis, fire resistant, Underwriters' listed. Withstands vertical flat crushing test of over 1200 pounds. Grooved ends lock together with the next spacer; centers notched for sawing.

New L-M Bend Spacer Bar:

a duct-installation leveller, used horizontally or vertically for accurate alignment of conduit around bends. Saves hours of work in lining up. Offers a tremendous saving in installation labor costs. L-M exclusive. 20″ long, 1½″ square, easily sawed to length.



New L-M Multi-Use Bend Sections and Angle Couplings:

use in any combination to make all kinds of special bends and crossovers. Male and female tapers offset 2½°, giving 5° bend in each section. Smooth inside, watertight tap-tite joints.

The L-M System makes Fibre Conduit *so easy to use*

New L-M Fibre Conduit Vise

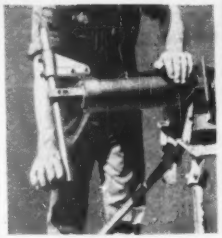
An easy, safe way to hold fibre conduit for sawing or tapering. For mounting on truck or bench, or with detachable tripod for use in the field, on the job.

With L-M Fibre Conduit and L-M equipment and tools, L-M's system speeds up underground installations, makes better jobs.

L-M Fibre Conduit is strong, light, tough; yet it's easy to taper and cut to length. L-M base spacers, intermediate spacers, and bend spacers assure a firm foundation and a rigid structure that won't settle or shift.

L-M tools save hours of time in the shop and on the job. Better get the low-down on this high-class, time-saving equipment.

GET THIS FREE HANDBOOK! Pocket-size manual covers recommended underground construction practices; contains valuable reference tables. Ask the L-M Field Engineer for a copy, also for new Fibre Conduit folder; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



New L-M Tapering Tool

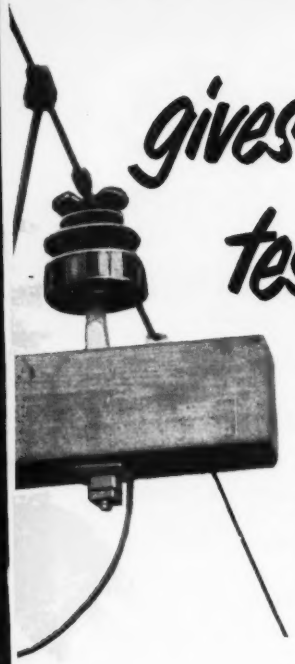
Cuts a precise 2° taper on the end of conduit to assure tight, snug joints. Light; easy to use; saves time; cuts costs by salvaging cut ends and short lengths quickly.

LINE MATERIAL ... Fibre Conduit

Complete Coordinated Equipment for Distribution Today

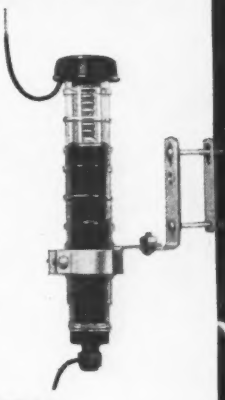
LOOK!...LM
LM®
LINE
ORTO

gives you the easy way to test lightning arresters



When lightning arresters are removed from service, it's important that they be tested, so that no faulty arresters are re-used. But it's *particularly* important on a delta-to-wye conversion program.

On a delta system, an arrester may be faulty, with no serious operational disadvantages. But on a grounded wye system, this same arrester can cause no end of grief—radio noise, line lockouts, and so on! So—it's necessary to be certain that any arrester removed from delta service be thoroughly checked before it is re-used on a wye system.



Electrical testing is one way

Generally speaking, the individual tests required on each arrester are these:

1. **60 cycle sparkover test**
2. **Leakage current test**
3. **60 cycle follow current test**

Testing equipment required varies from an induction regulator and high voltage transformer plus accessories for test No. 1, to a surge generator for test No. 3. Such equipment is expensive, and laboratory tests take considerable time of skilled men.

Visual testing...the L-M way

You are fortunate if you have L-M's Type E arresters in Pyrex® glass housings. Absolutely no electrical testing is required to determine their condition. *Visual* inspection is the complete test! Should the spark gap be damaged by any cause, permanent telltale evidence can readily be observed by a *Look* through the glass housing. If the valve element is defective, the Isolator will be blown! Just a *Look* tells the whole story. You can confidently re-use L-M glass-housed arresters after only visual inspection.

Get These Bulletins on Arresters and Testing. For complete information on L-M lightning arresters in Pyrex glass housings, ask the L-M Field Engineer for Bulletin LA-2. And there's a reprint of an L-M engineer's article on "Testing of Distribution Lightning Arresters"—with details, test circuits—Sheet 49087. Ask for that, too, if you're interested. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

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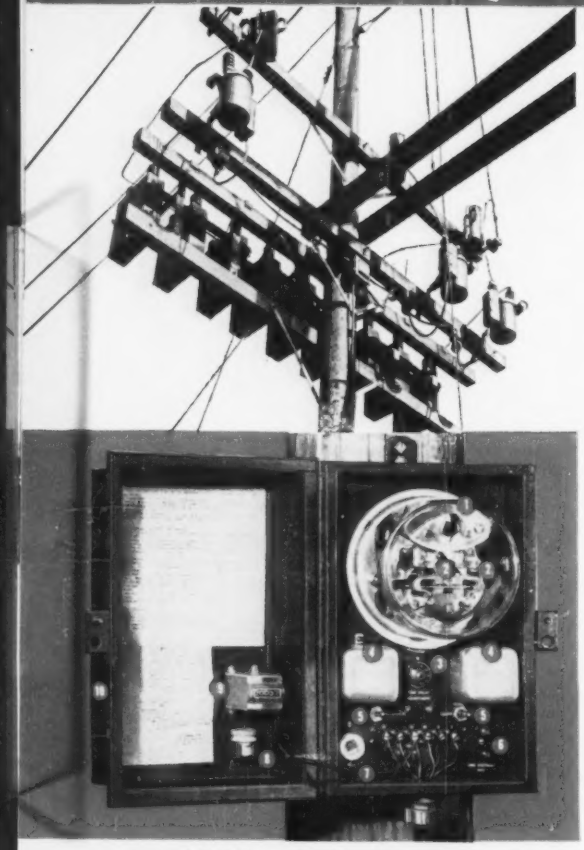
MATERIAL Lightning Arresters

Complete Coordinated Equipment for Distribution Today

this 225 kvar automatic switched capacitor installation



Less than $6.37 per kvar

for equipment including
Elemex Capacitors, Kyle Type GR Switches, New L-M Voltage-Sensitive Control, Capacitor Racks, Cutouts, and Arresters

(Only $5.92 per kvar for 300 kvar bank for 4160 volt delta or 2400 volt wye.)

This unprecedented low cost of $6.37 per kvar for small banks of automatically switched capacitors is made possible through the introduction of L-M's new control equipment. At this low cost you are now justified in installing and taking advantage of all the dollar benefits switched capacitors can give you.

L-M's New Voltage-Sensitive Control

L-M's new voltage-sensitive control has been field-tested for more than two years, and is now in full production. Although fundamentally designed for controlling the Kyle type GR oil switch, its flexibility permits its use with other solenoid or motor-driven equipment, including large breakers.

Heart of the control is basically a watt-hour meter modified to make it volt-sensitive. Over 3/16" contact travel per volt (120 volt base) assures extremely sensitive operation. Voltmeter is temperature compensated to ±1% accuracy from −30° F to 140° F. Line voltage can be determined within this accuracy without the use of external portable instruments. Once band width and midpoint settings are established, they are accurately maintained and need no periodic checking.

Voltmeter is mounted in a standard meter socket. Installation can be completed and tested before meter is installed, so that the test engineer doesn't need to be present until the line crew has finished its work.

Arc-suppression and filter circuit assures complete freedom from interference at telephone, radio, or television frequencies.

L-M Voltage-Sensitive Control

1. Nominal line adjustment on voltmeter—110 to 130 v.
2. Band width adjustment—2 to 12 v. with recommended minimum of three volts.
3. Time delay adjustment—instantaneous to 4½ minutes. Synchronous motor drive unaffected by variation in ambient temperature or voltage.
4. Enclosed selector relays—carry full burden of oil switch driving mechanism.
5. Toggle switches permit automatic, test, or instantaneous manual operation of oil switches.
6. Line voltage test connections.
7. Fuse protects entire circuit.
8. Spare fuse plug.
9. Operation counter (optional).
10. Weather-proof cabinet with threaded conduit nipple and multiple knockouts.

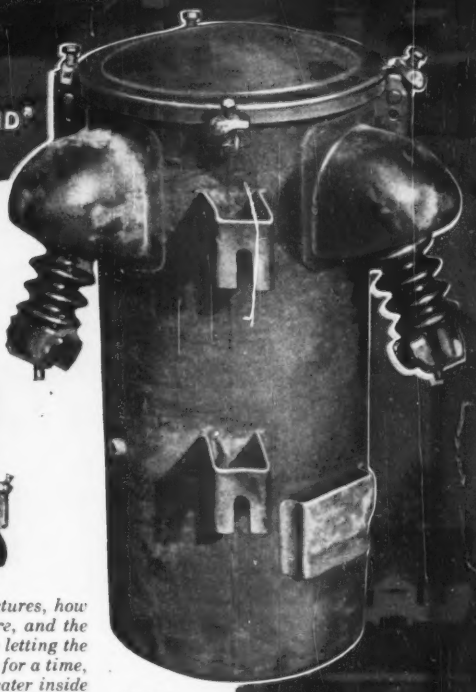
Get the whole story. Ask the L-M Field Engineer for bulletin on Elemex Capacitors and information on L-M's complete switched capacitor installation and the new voltage-sensitive control; or write Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).

LINE MATERIAL Capacitors

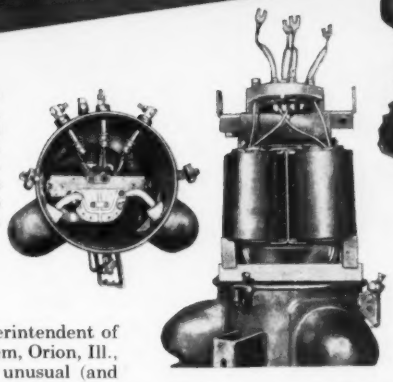
Completely Coordinated Equipment for Distribution Today

FLOOD BATTERED...

...THEN BURIED IN MUD, THIS L-M ROUND-WOUND* TRANSFORMER IS READY TO GO RIGHT BACK TO WORK!



Battered by flood water that shattered the pole, and buried under mud and rocks, this L-M Round-Wound transformer suffered only minor damage—and there wasn't a drop of water or mud inside!



PHOTOS BY K. M. NORCROSS

K. M. Norcross, superintendent of Sherrard Power System, Orion, Ill., recently reported an unusual (and unintentional) test of the rugged construction of L-M Round-Wound transformers. Here is what he says about it:

"Last spring the Mississippi River reached its highest flood level in 20 years. Before dawn one morning the river went through a dike, taking with it one of our poles on which was mounted one of your 5 kva Round-Wound transformers.

"We never saw that pole again—until a month ago. A dragline cleaning out a drainage ditch 1500 feet away dug the transformer out from under 5 to 10 feet of mud and rocks. Two feet of the pole was still attached but was badly shattered, and the tank was badly scraped and battered—evidence of the terrific battle the transformer and pole had with the river.

"The internal condition was excellent—almost as though it had just come off the assembly line. The oil was gone and one bushing was chipped and loose—but there wasn't a drop of mud or water inside and it was obvious that the damage occurred when the transformer was dug out.

"Note, in the enclosed pictures, how clean are the coils, the core, and the inside of the tank. We are letting the core and coil out in the air for a time, just in case there is any water inside—and then we'll put it back on the line. I just thought you'd like to know how much abuse a Line Material transformer can take!"

(Signed) K. M. NORCROSS,
Superintendent

At L-M's request, the transformer was shipped to the Zanesville plant, where it was tested and found to be in perfect operating condition. The only work required was replacement of bushings, repainting the tank, and refilling with oil.

There's much more to L-M Round-Wound transformers than just rugged construction and flood-proof tank sealing. Ask the L-M Field Engineer to tell you about their superior performance characteristics and long life. Or write for bulletins. Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LINE MATERIAL

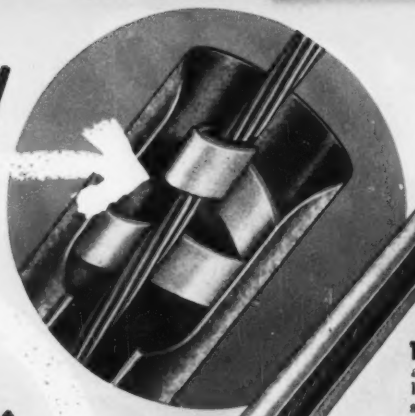
Transformers

RELY ON ROUND-WOUNDS ... BETTER ALL AROUND!

can't rattle!

L-M's new GUY WIRE PROTECTOR

clamps guys firmly



1. Good tight anti-rattle hooks grip any strand from ¼" to ½" firmly and permanently.

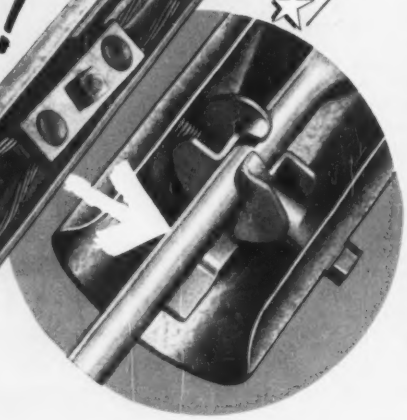
2. Body is 18-gauge steel, heavily L-M-hot-dip galvanized to assure long-lasting protection.

3. Rounded edges add rigidity and safety. No rough edges to cut hands or snag clothes.

4. Long 30-inch cutaway at bottom permits putting the protector over anchor rod and two 6-inch clamps—a unique L-M feature.

5. Bottom clamp conveniently tightened with bolt on the side of protector. Grips any size from ¼" strand to 1" anchor rod. No loose parts to fall out.

can't twist!



L-M guy wire protectors offer extra features for safety and savings. Large size, fully rounded design, and bright L-M galvanizing assure high visibility. Design speeds up the installation. Generous, easily accessible clamping assures a firm grip — it's almost impossible for the protector to rattle or rotate. In 7′ and 8′ lengths.

74

LINE MATERIAL

Line Construction Materials

Complete Coordinated Equipment for All Distribution Requirements

FOR FULL INFORMATION on these and other L-M Line Construction Materials, ask the L-M Field Engineer—or write Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).

You get GREATER ultimate strength

in L-M's new reinforced wireholder

L-M's new wireholder is as tough and strong as they come. In over-all comparative tests it exceeded most others tested based on both dead-end pull and 90° side pull.

It was developed only after extensive tests of a number of designs, in order to give you the greatest possible ultimate strength.

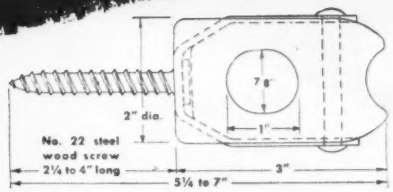
Screw is long, sharp, firmly fixed—with choice of screw lengths from 2¼ to 4 inches. With porcelain base directly against the wood, there is less danger of cracking the porcelain than when it is in contact with a metal ring. Porcelain has a good, well-rounded design, to avoid abrasion of wire.

It's a good wireholder, typical of the many line construction materials L-M offers.

COMPARATIVE STRENGTH TESTS

TYPE AND MAKE OF WIREHOLDER	AVERAGE ULTIMATE STRENGTH, POUNDS	
	Dead End Pull	Side Pull, 90°
L-M New	1800 lbs.	1600 lbs.
L-M Old	1750	1500
Make A	1600	925
Make B	1100	975
Make C	2300	825
Make D	1800	925

IMPROVED DESIGN OFFERS GREATER RESISTANCE TO DEAD-END AND SIDE PULL



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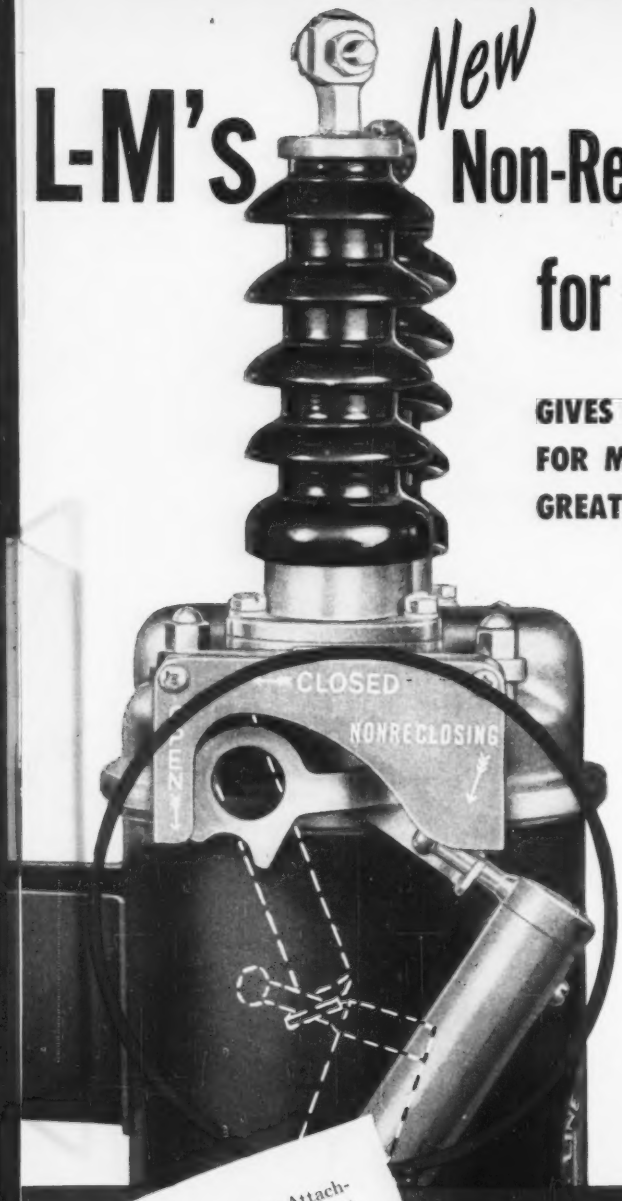
L-M's *New* Non-Reclosing Attachment for Kyle® Reclosers

GIVES GREATER SAFETY FOR MEN AND EQUIPMENT... GREATER SAFETY IN HOT LINE WORK



L-M's new Non-Reclosing Attachment provides lockout of the recloser on the first fast operation. Should an accidental contact or arc occur while men are working on the line, the recloser opens instantly and stays open, instead of continuing through the usual complete four-operation sequence.

This new attachment provides the same protection out on the line that has been available only on substation breakers. It permits hot line work with far greater safety to men and equipment. The attachment is available at a small extra cost on all Kyle reclosers.

For complete information ask the L-M Field Engineer or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

72

The Non-Reclosing Attachment lever is under the sleet hood next to the regular reset handle. Pulling down the lever puts the attachment into operation but *does not* open the line. When work is completed the lever is pushed back up—and the recloser will then operate normally.

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HEADACHES DUE TO SKYROCKETING COSTS OF INVENTORY MAINTENANCE

Further "Across-the-Board" Simplification of Materials and Supplies

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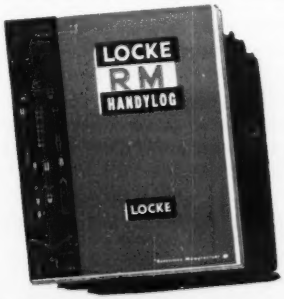
Many utilities are finding the answer by taking a closer look at their standardization programs. They often find that they can materially reduce the cost of inventory maintenance through further simplification of stocks.

If you're one of these, then Locke can help you.



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It's the perfect working partner for men wanting to further standardize and simplify their stocks of Pole Line Hardware. It lists ONLY the standard items you need. By using it, you stock fewer items, all fast movers. Each is regularly in production, and carried in stock by your Locke Regional and Distributors' Warehouse. If you haven't got a copy, write for Locke's RM Handylog today. Place the items in it on your standards list. Do this and you'll be taking the industry's only practical short-cut toward further simplification of hardware stocks. Locke Department, General Electric Company, Baltimore, Maryland.

*RM (Repetitive Manufacture) *A program designed to help reduce the installed cost per kilowatt on line and station equipment.*

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Sturdy regulator construction assures long, trouble-free life. All relay moving elements are mounted on stainless steel spring hinges. Thus, maintenance inherent with bearings is eliminated. Metallic contact of the pole faces on the motor-operating relay has been entirely eliminated by use of the spring-supported, snap-action element, making it impossible for the relay to stick because of residual magnetism.

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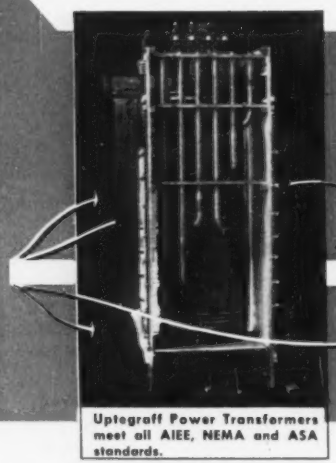

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Built to meet standard or special requirements, Uptegraff High-Voltage Power Transformers are made in sizes through 10,000 KVA, for use on all voltage systems through 115 KV.

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Uptegraff offers complete engineering, manufacturing and testing facilities, including 1.5-million volt impulse generator now being installed.

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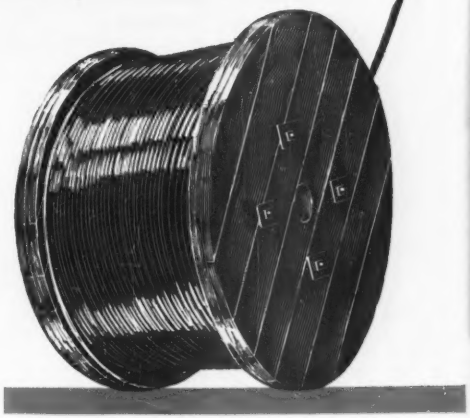

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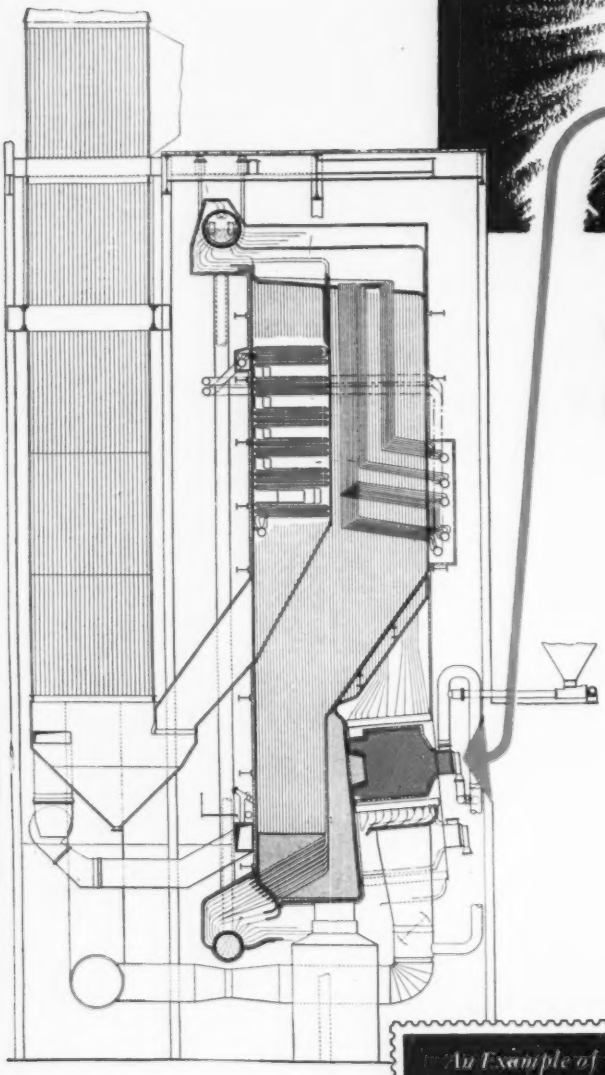

- **Savings**
  through simplification of collectors and ash-handling equipment, due to drastically reduced volume of fly-ash leaving the furnace.
- **Savings**
  through lower cost and maintenance of coal preparation equipment.
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  through higher boiler efficiency due to low excess air.
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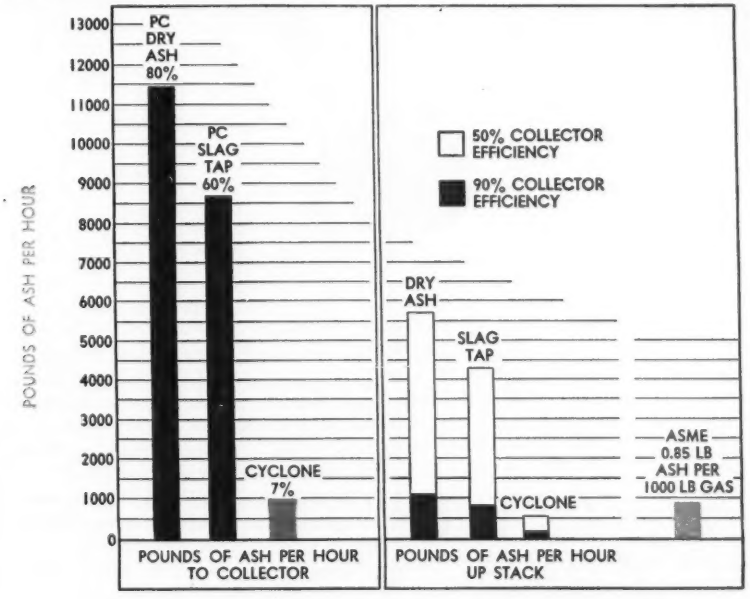

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Editorials

The General Business Outlook for 1952

[This special report was prepared for Electrical World by Dexter M. Keezer, Director, Department of Economics, McGraw-Hill Publishing Co]

Right now defense expenditures are running at a rate of $43 billion per year. A year from now they have been scheduled to reach a peak of $65 billion per year.

Personally, I do not expect that peak to be attained. In fact, I'll be surprised if defense expenditures are running at a rate of much more than $50 billion a year in 12 months.

I have two reasons for this expectation. One is that I don't think World War III is becoming more imminent, I think it is becoming less imminent. My second reason is related to the first. If there is no war by next summer, we shall then be piling up reserve stocks of some types of military equipment. The military people do not like to see fields and warehouses being filled with tanks, trucks, etc. It represents a tremendous investment in equipment which may rapidly become obsolete. And Congressmen are very quick to criticize this piling-up process. So the Pentagon is very likely to revise its procurement schedules downward once large stocks begin to appear.

The U. S. Treasury will also be interested in slowing down procurement if it appears this can be done without jeopardizing the national safety. Under present defense spending schedules, the federal government would run a cash deficit of $15 billion in the second half of 1952. The Treasury would have to borrow most of this money. The national debt would go up more rapidly than ever before in peacetime. And deficit spending of this kind would add greatly to inflationary pressures, a risk which the administration may not care to take in an election year.

The money could, of course, be raised by taxes. But in an election year, Congress is very unlikely to do any such thing. So the Treasury, left with its problem, will probably bring additional pressure on the military to slow down procurement.

Consumers are going to start off the year with the wherewithal to sustain great prosperity in the industries which cater to them. Even when higher taxes are taken into account, the consumer income next year may well be $12-$15 billion larger than it is this year.

But getting them to spend the money is something else again. That was dramatically demonstrated between the first and the third quarter of this year. Over that period the disposable income of consumers (i.e., money in the hands of consumers after paying taxes) jumped from $217.5 billion to $225.7 billion, an increase of over $8 billion. But people did not rush to spend their money. Over the same period savings jumped by $9.3 billion.

A basic explanation of this remarkable development is, of course, that as a nation we have become so rich that we can postpone spending a large share of our income for a long time without any immediate personal inconvenience.

How large this range of so-called optional consumption is I don't know. I have seen plausible guesses that it covers as much as 40% of the total income received by individuals. Whether it is 40 or 30 or 50%, I think it is probably the most important single fact about the kind of economic situation into which it seems to me we are moving. It means, in effect, that there is abundant business to be had, but you must rustle for it. Put more flatteringly, it means that the salesman is becoming the key custodian of our prosperity.

Salesmanship is going to be needed not only in consumer lines but also in industrial fields. Business—like the consumer—still has the money to invest large sums in plant and equipment, as well as operating supplies, during the coming year. But whether companies will want to spend as much as they have recently is a different question. In a year when the defense program is likely to slow down, you will have to give business firms good reasons why they should keep on spending.

On the basis of these factors, it seems to me that: (1) We will have relatively little price inflation in 1952, (2) that business as a whole will operate in an increasingly competitive atmosphere as the year goes on, and (3) that the pinch in metal supplies will be eased as the year goes on.

In Lives or in Money?

"A two-decker suburban bus mowed down and killed 23 marching boys in a dimly lit street here tonight. Nineteen others in the Royal Marine cadet formation of about 50 boys were injured."

That happened Dec. 4, 1951, in Chatham, England. The quotation is from an AP dispatch printed in the "New York Herald-Tribune."

The horror of this accident is emphasized by the words, "a dimly lit street," because dimly lit streets have long been recognized as places where Death beckons with his bony finger.

There are many reasons—and many of them are good reasons in terms of money cost and other considerations, however poor in terms of potential death and injury—why dimly lit streets so largely survive in this age of so easily available electric light. These reasons have much weight in England where every kilowatt hour must be jealously measured out and every item of cost held to the absolute minimum. But the people of England must feel as we do here, that the deaths of 23 boys and the injury of 19 others is a frightfully high payment for such economy of electricity and money.

This shocking accident in Chatham is only an installment payment on the human cost of poor street lighting. The payments, large and small, continue to be made night after night in the cities of the civilized world, here as well as in England and other countries. The sad thing is that these payments in grief and suffering—and in money, too—exacted by poor street lighting are simply in lieu of just money payments for good street lighting. Because, poor or good, street lighting is paid for. In what currency do we want to pay for it, in lives or in money?

Now Is the Time

We were shocked recently to find the top management of a large utility unaware of the critical seriousness of acquiring land for substations and rights of way already planned and authorized. It is entirely possible that there are perfectly valid and understandable reasons for this situation (where some sites are not finally acquired until the day construction commences). But there can be no excuse for failing to recognize the problem and to take steps to prevent its recurrence.

Land acquisition has admittedly become increasingly difficult, particularly in rapidly growing cities and small towns. Sites which are scouted 2 or 3 years ahead of need will many times be developed by the time the utility decides to locate, knocking orderly planning into a cocked hat.

From our contact with utility management, we believe that most are well aware of the problem. Most have decided to do something about it. One utility president told us he has instructed his planners to determine and acquire land that will be needed in the next ten years. With no end of the inflationary spiral in sight, he feels that he can't lose on urban real estate. And he stands to gain tremendously by having the proper sites to allow most efficient system expansion without costly delays or compromises for expediency.

It is not enough, however, for management to make the decision to buy land in advance of need. It must also see that funds are provided to carry out that decision. In the first case we mentioned, management is satisfied that its system is being expanded on a long time plan and that sites are being acquired in advance. The cold hard facts are that everybody thinks it a fine idea, but no money is authorized. Result is hand-to-mouth buying of whatever land is available at the last possible minute before the substation or line must be located.

Land acquisition will almost certainly continue to be one of the most delicate of the public relations problems of the utility industry. By adopting a far-sighted policy of acquisition in advance of need, the industry stands to gain tremendously in facilitating orderly and efficient expansion with a minimum of public controversy over noise, appearance, and condemnation. In addition there will be a considerable saving in land costs over the long pull. Certainly these benefits are well worth the effort of the additional financing required.

An Easy Answer to Difficult Questions

A booklet that answers the usual questions the public asks about the industry has just been published by Edison Electric Institute. It is the fourth edition of "I Want to Know about the Electric Industry." In it EEI answers the 27 questions most often asked of it in the preceding year.

As in the earlier editions, the editors have done a superlative job. The book not only answers the questions but answers them in such language that the public can understand. If operating companies will place copies of this booklet in the hands of newspaper editorial writers and reporters, there will be less chance of items misrepresenting the industry getting into print. And if the companies will buy a quantity of them from EEI, they will have available an easy and convincing way in which to answer the sincere question of the public.

Another Water Shortage

Where is the condensing water going to come from to support the prospective 200 million kw of national generating capacity founded on steam? How many kilowatts can be sustained by the rivers on which inland plants have to be located before the thermal possibilities are exhausted? One alternative will be to transmit the requirements from the best seacoast and lake sites. Another will be to resort increasingly to cooling towers and spray ponds. The limitations are not too far away and a nationwide survey of water resources should be available soon to let the power industry know the facts.

The Electrical Week

Utilities got through the peak period of 1951 satisfactorily as usual, a telephone survey by EW indicated. Here are the estimated and actual peaks of some of the companies:

American Gas & Electric System estimated a peak of 2,710,000 kw and reported that delays in defense loads accounted for the difference from the actual peak of 2,660,000 kw . . . Cold weather would have pushed the 5,828,000-kw peak of the Pennsylvania-New Jersey interconnection closer to the estimate of 5,850,000 kw . . . Consolidated Edison of New York reported a peak of 2,716,000 kw and an estimate of 2,750,000 kw. This does not include Staten Island . . . New England interconnected system had not yet compiled actual figures, but peak loads had been running about 1% below estimates.

WASHINGTON—*ECA has authorized Nationalist China to place some $2 million worth of orders for materials for its Tien-Leng hydroelectric project on Formosa . . . Second unit at TVA's New Johnsonville steam plant is producing power with the third scheduled for service in February . . . Guy W. Thaxton, formerly in Depa's Power Coordination and Planning Branch, is new power engineer in AE&C's Division of Construction Supply . . . Seeking to quiet opposition to a hydro project on south fork of New River in North Carolina, Blue Ridge Electrical Membership Corp has amended its FPC application to strike out diversionary features.*

Volume of military prime contracts in fiscal year 1951 totaled $29.7 billion of which 100 companies received $18.3 billion or 61.5%. Of the 100 companies General Electric ranked 5th with $654.2 million (2.2%); Westinghouse 18th with $324.4 million (1.1%); International T&T 23rd, $179.3 million (0.6%); Allis-Chalmers 25th, $167.4 million (0.6%); Avco Manufacturing 29th, $153.6 million (0.5%); RCA 31st, $144.6 million (0.5%); Philco 42nd, $94.5 million (0.3%); Emerson Electric 50th, $78.3 million (0.3%); and Sylvania Electric 91st, $31.5 million (0.1%).

First 300-kv, oil-filled cable in North America (about 4" in diameter, 515-Mcm, single-copper conductor, hollow core, paper insulated) will carry power from the underground generating chamber to the switchyard of Aluminum Co of Canada's Nechako-Kitimat project in western British Columbia.

Installation of the first commercial mobile relay station in U. S. will be completed by middle of January on the Powell Valley Electric Cooperative system in the Cumberland Mountains, Jonesville, Va.

Portland General Electric gets 50-year license from FPC to build $22.1 million power plant (108,000-kw) on Deschutes River in Oregon . . . FPC also affirms, with certain modifications, its 1949 orders authorizing hydroelectric developments by Pacific G&E in King's River basin of central California.

TVA placed third of six 45,000-kw units at Wolf Creek Dam, Ky., on lines Dec. 16 . . . Georgia Power begins operating a 20,000-kw unit at Bartlett's Ferry Dam on Chattahoochee River, bringing total capacity of the project to 65,000-kw . . . New York State E&G places in operation 75,000-kw addition to its Goudey steam plant at Westover.

Bonneville Power Administration, which is already operating the world's largest power utility microwave communicating system, has contracted for an additional PTM (pulse-time-modulation) microwave link to connect its John D. Ross substation in Washington with a similar station in Goshen, Ore.—a distance of 128 miles, Federal Telephone & Radio Corp reports.

Columbus & Southern Ohio Electric asks PUC approval to up industrial and large commercial light and power rates $1,625,000 annually based on its 1951 operations . . . Consolidated Gas of Baltimore asks PSC approval to increase electric and steam rates about $6.5 million yearly.

People of America are enjoying the benefits of approximately 60% more light today than they did only five years ago, Fred F. Harroff, head of GE's Lamp division, says. Production of this amount of light requires as much electric power as was sold in the nation for all purposes only 15 years ago, he adds.

Pacific G&E directors authorized an offering to employees, under a time payment plan, of 163,986 shares of 5% redeemable first preferred stock, series A . . . Pacific P&L files registration statement with SEC to sell 552,792 shares of common stock of which 200,000 shares will be offered by the company and 352,792 shares will be sold by present holders.

Congratulations—Florida Power Corp elects W. J. Clapp president, succeeding W. C. Gilman who becomes chairman of the executive committee but will return to active partnership in W. C. Gilman Co., New York . . . Westinghouse Electric International elects Robin S. Kersh executive vice president, succeeding E. V. Huggins who was recently named Assistant Secretary of United States Air Force.

Acceptance of the NEC Is Far From Unanimous
Of 1106 Municipalities studied . . .
433 Use the NEC without change . . .
654 Have modified the NEC . . .

Lack of Uniformity in Local Codes Retarding Full Power Utilization

Nema surveys 1,100 municipalities and finds that while National Electrical Code is accepted as standard the majority modify it. City officials, contractors, labor, and utilities sponsor own "preference" clauses

Lack of uniformity in regulations for the installation and construction of electrical equipment is retarding full utilization of electric energy. Though the National Electrical Code is the basis for the regulations of most cities, it is frequently modified so as to lose much of its effectiveness as a national standard. The effect of the modifications is to make installations more difficult and costly and in many cases less safe.

These are the conclusions that can be drawn from a survey conducted by the National Electrical Manufacturers Association. Nema first studied several hundred ordinances, laws and regulations enacted in the various states and municipalities. Then, questionnaires were sent to the chief electrical inspector in each municipality where there was known or thought to be some form of governmental inspection or legislated regulation of electrical installations. In this way it was possible to collect information on the rules of over 1,100 local governments. The populations of these communities is over 68 million.

An analysis of these questionnaires brought out that local regulation is based largely on the National Electrical Code, the American standard for electrical installations. However, it is found that many cities have enacted ordinances which modify or add to it.

Some of these modifications cover very minor matters. For example one city requires that raceways be cut by saws or metal-removing parting tools of the type which leaves a clean square cut. On the other hand, some ordinances are so drastic that the use of long-recognized, standard methods or materials is prohibited or severely limited. One of the most prevalent of these limits the wiring that may be used.

Here are examples from various sections of the country showing how drastic these restrictions are:

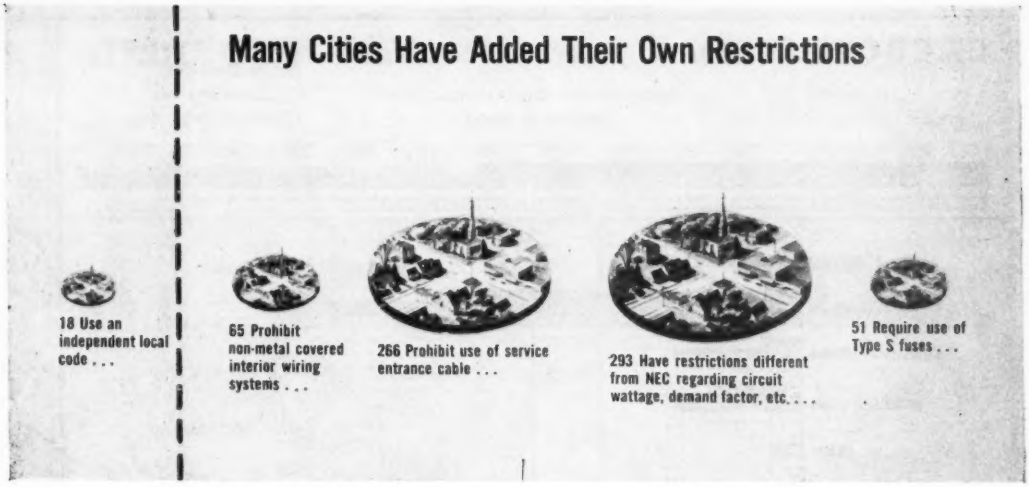
Huntington Park, Calif.—The 1947 ordinance prohibits the use of wiring materials other than rigid conduit, electrical metallic tubing, or flexible metal conduits.

Miami, Fla.—The use of all standard types of metal raceway is permitted, but use of armored cable and all the non-metallic systems is prohibited.

The broader picture of how cities have accepted the national code or accepted it with modifications is given in the pictorial charts at the top of the page.

While municipalities have adopted many code modifications, there is no indication that these are to correct any deficiency. To the contrary the various municipal codes demonstrate a very strong, but puzzling, individualism. Judge by these four examples of regulations on wiring methods.

1. Tampa, Fla., has a 1947 ordinance that permits use of most recognized wiring methods, including knob-and-tube work, open wiring on insula-


Many Cities Have Added Their Own Restrictions
18 Use an independent local code . . .
65 Prohibit non-metal covered interior wiring systems . . .
266 Prohibit use of service entrance cable . . .
293 Have restrictions different from NEC regarding circuit wattage, demand factor, etc. . . .
51 Require use of Type S fuses . . .

tors, non-metallic sheathed cable, and service-entrance cable but rules out armored cable.

2. Springfield, Mass., prohibits in its 1939 ordinance the use of service-entrance cable and knob-and-tube wiring but permits use of open wiring on insulators, non-metallic sheathed cable, and armored cable.

3. Elizabeth, N. J., permits use of armored cable, knob-and-tube work, and open wiring on insulator, but non-metallic sheathed cable and service-entrance cable are not recognized .

4. Charlotte, N. C., in a 1950 ordinance permits use of most of the accepted wiring methods but rules out open wiring.

What is the explanation of all these local deviations from the national code? Pride of authorship on the part of a local official is one reason. Another is the desire to have a simple compendium covering the type of buildings prevalent in the community. Moreover, some inspecting authorities feel that it is easier to assure safety by prohibiting entirely the use of a certain material or method than it is to do so by careful and thorough inspections or installations which embody that material or method.

In some cases, certain products or constructions have been outlawed because of isolated instances of failures of installations. These prohibitions are made without due regard to whether the failures were from some extraneous cause and without giving weight to successful use in other communities.

Code Revision Fails

Milwaukee, Wis., common council rejected by a vote of 18 to 9 a move to liberalize the city's electric code. The aldermen voted against permitting use of nonmetallic sheath cable and service entrance cable for home wiring and then refused to accept a substitute amendment allowing use of service entrance cable alone.

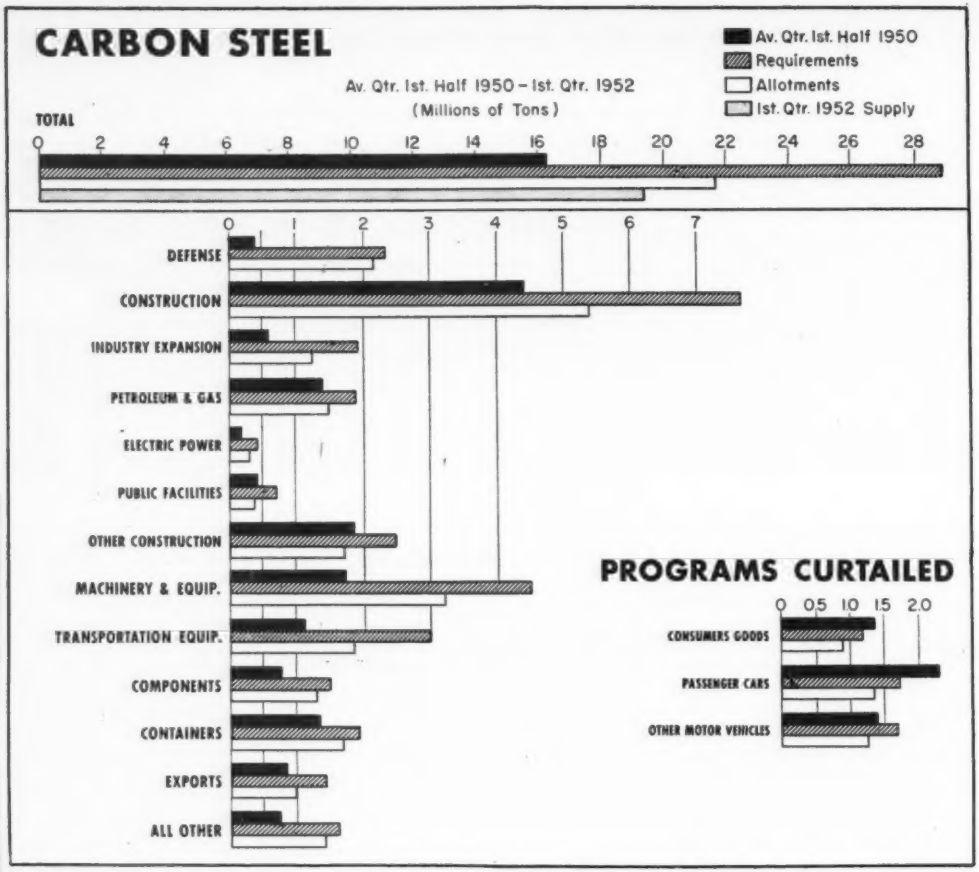
Selfishness is behind many of the special rules. Contractors often secure passage of local codes prohibiting certain types of construction in the belief that they will get more business. This is surprising since contractors should be interested in having codes in neighboring municipalities uniform.

Labor also frequently exerts its influence toward restrictive codes. Generally the object is to outlaw such ready-made materials as armored cable and non-metallic sheathed cable so as to favor those wiring methods that require more local labor. However, it has been demonstrated that labor does not necessarily benefit from restrictions calling for higher-cost types of construction.

The same amount of the purchaser's money put into lower cost, but safe construction, will buy a more extensive installation having more outlets. The bill for labor will be approximately the same, and the purchaser, contractor, and the entire electrical industry will benefit. Such larger installations can be sold if there are no restrictions forcing up the unit cost for service. The Adequate Wiring Program has already achieved a considerable success in such selling.

Utilities usually support the national code. However, a considerable number seem to have influenced their local governments to enact their service rules into law. Numerous ordinances contain detailed requirements on size of meter boards, type of meter sockets or meter-testing lugs, and specific location of service equipment. These regulations can be covered by the utility's own service rules and contracts with its customers. Such regulations made a part of the local electrical code only encourage other local interests to fight to include their own "preference" clauses.

The problem of obtaining uniformity of electrical installation codes is one that has grown as more and more local governments have assumed jurisdiction. In many places underwriters or other inspection was previously in effect. Much progress, however, has been made toward uniformity. Denver, San Antonio, Cleveland, San Diego, and New Orleans have recently adopted the National Electrical Code. Efforts are being made to secure similar action in a number of other cities.



DEMAND for carbon and structural steels has increased rapidly since the outbreak of hostilities in Korea. That's why new steel capacity has not been able to supply all consumers. Strict allocation has been the result. Charts on these two

Utilities Can Get Additional CMP Materials for Disaster Repairs

In emergency cases electric utilities may obtain controlled materials in excess of their minor requirement quotas under a new amendment to NPA Order M-50. The amendment will permit utilities to obtain the supplementary materials to repair damages caused by such disasters as fire, flood, wind, and earthquake.

Defense Electric Power Administration also announced other recent amendments of Order M-50. Among them:

1. Appendix C now permits electric utilities to order up to 1,000 lb of carbon steel even though their minor requirements quota is less than 1,000 lb.

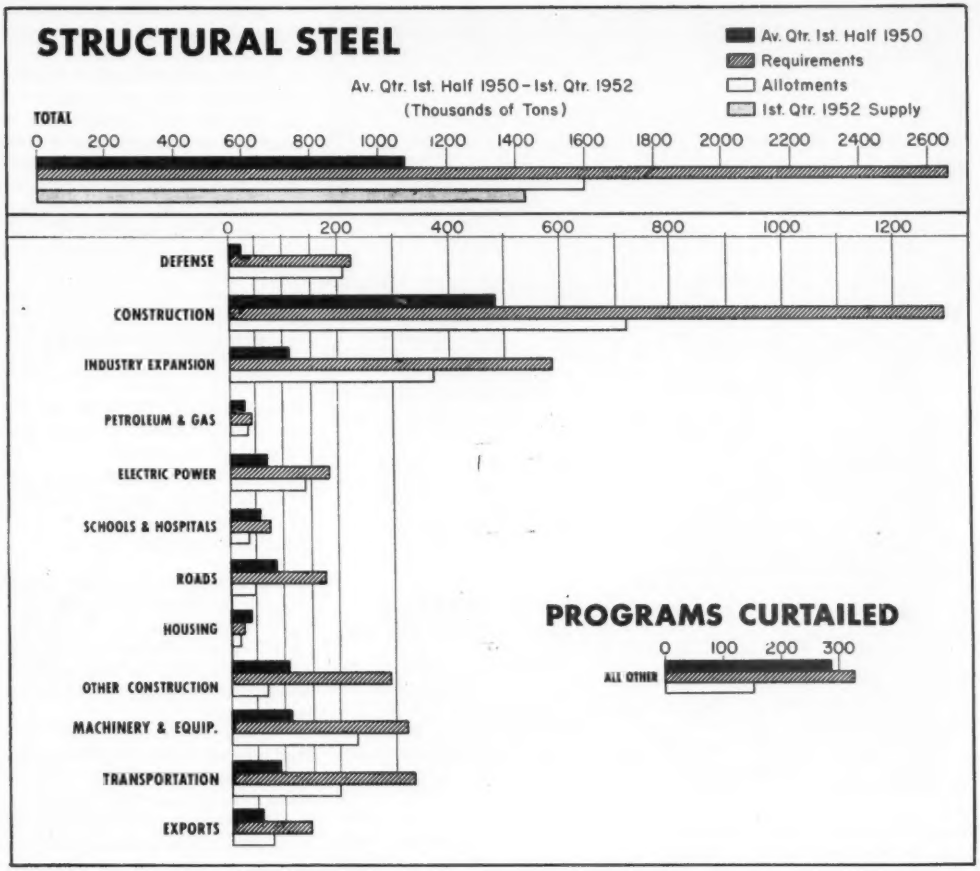
2. Section 22 now prevents electric utilities from receiving any controlled materials except within authorized allotments of the Defense Electric Power Administration.

3. Section 21 shows relationship of M-50 inventory provisions to other orders and regulations of the National Production Authority.

4. This change also requires repairmen doing work for electric utilities to use the H-4 allotment symbol assigned to the utility. This means merely that materials acquired in this manner will be charged against the power company's quota.

5. Section 23 has been deleted because the use of the DO-48 symbol has become obsolete.

6. Section 34 now permits electric utilities to use the DO-H-3 rating to obtain production machinery and equipment needed to complete approved major plant additions to the same extent allowed under CMP Regulation 6. This section formerly prohibited use of the rating to obtain any items listed in Schedules I and II of CMP Regulation 5.



pages show pre-Korea application of carbon and structural steels, how much various users wanted for the first quarter of 1952, and how much they got. The picture as it applied nationwide is shown in the bars at the top of the charts

IUE Seeks Government Help to Get Westinghouse to Open Lamp Plant

International Union of Electrical Workers, CIO, in seeking to bring government pressure on Westinghouse Electric Corp to keep it from closing permanently its Bowling Green, Ky., photoflash lamp plant.

In a telegram to President Truman and top mobilization officials, IUE Pres James B. Carey asked the government to withhold further certificates of necessity from the company if it abandoned the Kentucky plant. These certificates permit rapid tax amortization of defense production facilities.

Westinghouse would not comment on the Carey telegram.

The company shut down the plant Dec. 4. It had been closed by work stoppages since Aug. 15 as a result of a wage dispute. When the union refused to give the company assurances that the work stoppages would be discontinued, Westinghouse closed the plant for good. At that time Westinghouse cited increased demands for photoflash bulbs and heavy financial losses at Bowling Green, coupled with no assurance of uninterrupted operations, as reasons for closing the plant.

Carey's telegram said in part, "We believe that the U. S. government cannot in good conscience nor in furtherance of the national defense program countenance the shameful situation which would result with Westinghouse abandoning a perfectly productive plant and then use scarce materials, manpower, and government tax privileges to build new facilities."

Carey called the Dec. 4 close-down a "brutal action" and said withholding of the certificates of necessity possibly might force use of the plant.

He said that the plant cost more than $1 million and was used during World War II to produce electronic equipment for the Navy.

YIELDS (%) — Operating Electric Utility Securities

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1951									
Dec. 20	3.00	3.05	3.18	4.31	4.51	4.89	5.40	6.17	6.84
Dec. 13	3.01	3.07	3.16	4.29	4.48	4.86	5.37	6.15	6.86
END OF QTR.									
3rd 1951	2.87	2.91	3.04	4.05	4.27	4.61	5.52	6.24	7.05
2nd 1951	3.02	3.11	3.23	4.11	3.37	4.68	5.73	6.38	7.78
1st 1950	2.87	2.93	3.00	3.96	4.19	4.52	5.47	6.20	7.13
4th 1950	2.65	2.67	2.78	3.86	4.14	4.51	5.80	6.54	7.44

Data: Reis & Chandler, Inc.

Boards of Carolina P&L, Tide Water OK Merger

A proposed merger of Carolina Power & Light Co and Tide Water Power Co (EW, No. 26, p 20) was approved recently by the boards of directors of the two companies.

Carolina has registered 33,000 shares of $5 preferred stock with the Securities and Exchange Commission to be used in connection with the plan to exchange them for Tide Water's $25 par preferred stock.

The merger proposal will be submitted to stockholders of the companies Feb. 4 at meetings in Raleigh and Wilmington, N. C.

The merger is expected to mean lower power rates and improved service for the area served by Tide Water. The name Tide Water Power Co would be dropped. Under the merger, Tide Water's Pres. Warren W. Bell and Executive Vice Pres. A. E. Jones would be retained by CP&L as vice presidents.

Louis V. Sutton, CP&L president, said he had been "gratified by the favorable reception accorded the proposed merger" by the press and public generally throughout the state.

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FPC OKs Missouri G&E, Missouri PS Merger

Federal Power Commission has authorized merger of Missouri Gas & Electric Service Co, Lexington, Mo., with Missouri Public Service Co, Warrensburg.

Missouri Gas & Electric facilities are located between the two separate service areas of Missouri Public Service. In approving the merger, FPC said the integration of the two properties into one ownership should improve service to customers and result in operating economies.

Under the merger plan, each of the 25,350 outstanding shares of Missouri G&E common stock will be changed into five shares of the new Missouri Public Service stock, and Missouri Public Service's common stock will be changed into three shares of new stock.

•

FPC Defers Rate Boost Asked by Missouri Utility

Federal Power Commission has acted to head off a proposed annual rate increase of $1,650,000 or 8.5% by Union Electric Power Co for power sales to its parent company, Union Electric of Missouri.

In announcing its decision to suspend the proposed increases, FPC said the data submitted by Union Electric Power does not appear to support the total amount of the proposed increase in many respects. The proposed schedules, said FPC, may result in excessive rates or charges, may place an undue burden upon ultimate consumers, may be unduly discriminatory or preferential, and may result in increased rates and charges which have not been shown to be justified.

The increase is suspended until the commission has held a hearing and rendered a decision, and use of the proposed increase schedule is deferred until May 20, 1952. If a decision has not been rendered by that date, the company may, under the Federal Power Act, put the increase into effect under bond and subject to the refund of any accounts subsequently disallowed by the commission.

No hearing date had been set by the commission.

FINANCIAL BRIEFS

Western Light & Telephone Co has offered its stockholders of record Dec. 10 the right to subscribe for 13,577 shares of common stock at $20 per share on 1-for-23 basis expiring Dec. 21. The stockholders had an oversubscription privilege.

Boston Edison Co has asked Massachusetts Department of Public Utilities for approval to issue $17 million of 3% bonds to mature in 1973 in exchange for a like amount of notes bearing the same interest rate and maturity date.

West Virginia Public Service Commission has set Jan. 28 to hear Appalachian Electric Power Co's proposal to increase rates. This is the first request for a general rate increase in the 25-year history of company.

Kansas City Power & Light Co is planning to sell 100,000 shares of $100 par cum preferred stock and 317,792 additional common shares. The common will be offered to present holders in a ratio of 1-for-6. It is expected they will be offered around Jan. 22 by a group of underwriters headed by First Boston Corp and Blyth & Co.

Electric Utility Financing

Company and Description	Amount of Offering (000)	Offering Price	Yield at Price to Public
SCHEDULED FOR JANUARY			
Bonds			Bid Date
Seattle, Wash.—municipal light and power rev, 1962-1986	$28,000		Jan. 8
Philadelphia Electric—1st and ref mtg 1982	35,000		*Jan. 9
Indiana & Michigan Electric—1st mtg 1982	17,000		Jan. 22
Indiana & Michigan Electric—serial notes 1956-1967	6,000		Jan. 22
Preferred Stock			
Florida Power Corp—51,550 sh $100 par cum conv	5,155		.....

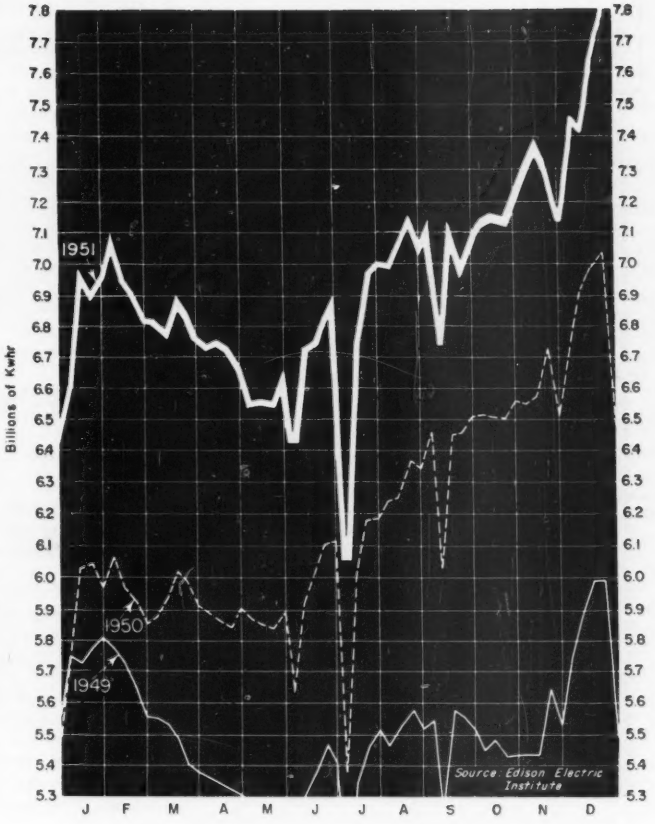
* To be offered by Drexel & Co and Morgan Stanley & Co group, underwriters.

Con Ed Program to Curb Smoke Set Back by Depa

Defense Electric Power Administration has rejected the request of Consolidated Edison Co of New York for permission to buy equipment to improve smoke conditions at three of its generating plants in New York City. Depa gave "the extreme scarcity of material" as the reason for its action.

The utility several weeks ago announced plans for a $3.7 million program to cut down smoke emission at the three plants to comply with regulations of New York City's Smoke Gontrol Bureau (EW, Dec. 17, p 78).

William G. Christy, director of the Smoke Control Bureau, called Depa's decision "very disappointing."



MEETINGS

★Edison Electric Institute
Accident Prevention Committee, Hotel Roosevelt, New Orleans, La., January 7-8, 1952; Electrical Equipment Committee, Netherlands Plaza Hotel, Cincinnati, Ohio, February 11-12, 1952; Transmission-Distribution Committee, New Hotel Jefferson, St. Louis, February 14-15, 1952; 18th Annual Sales Conference, Edgewater Beach Hotel, Chicago, March 31-April 3, 1952; Purchasing-Stores Committee, Roosevelt Hotel, New Orleans, La., May 11-14, 1952.

American Institute of Electric Engineers
Winter General Meeting, Hotel Statler, New York, January 21-25, 1952.

★National Adequate Wiring Bureau
Annual Conference, Sherman Hotel, Chicago, January 24-25, 1952.

★National Association of Purchasing Agents
Public Utility Buyers' Conference, Cleveland Hotel, Cleveland, Ohio, February 4-5, 1952.

Instrument Society of America
1952 Regional Power Plant Instrumentation Conference, New York Section, Hotel Statler, New York, February 7-8, 1952.

Missouri Valley Electric Association
Industrial-Commercial Sales Conference, Hotel President, Kansas City, Mo., February 7-8; Engineering Conference, Hotel President, Kansas City, Mo., April 2-4, 1952.

★Pennsylvania Electric Association
Winter Meeting, Transmission-Distribution Committee, Penn Harris Hotel, Harrisburg, Pa., February 7-8, 1952; Hydraulic Power Committee, William Penn Hotel, Pittsburgh, Pa., February 7-8, 1952; Systems Operation Committee, Benjamin Franklin Hotel, Philadelphia, Pa., February 14-15, 1952; Winter Meeting, Relay Committee, Fort Stanwix Hotel, Johnstown, Pa., February 20-21, 1952; Prime Movers-Electrical Equipment Committees, Benjamin Franklin Hotel, Philadelphia, February 28-29, 1952.

Public Information Program
East North Central Region Meeting, Fort Wayne Hotel, Columbus, Ohio, February 19, 1952.

American Society for Testing Materials
Spring Meeting-Committee Week, Hotel Statler, Cleveland, Ohio, March 3-7, 1952.

National Electrical Manufacturers Association
Section Meeting, Edgewater Beach Hotel, Chicago, March 10-13, 1952; 4th International Lighting Exposition-Conference, Industrial-Commerical Lighting Equipment Section, Cleveland Auditorium, Cleveland, May 6-9, 1952.

Southeastern Electric Exchange
Engineering-Operation Section Conference, Jung Hotel, New Orleans, La., March 13-14, 1952; Annual Conference, Boca Raton Hotel, Boca Raton, Fla., April 21-23, 1952.

National Association of Corrosion Engineers
Annual Conference, Buccaneer Hotel, Galveston, Tex., March 10-14, 1952.

Illuminating Engineering Society
South Pacific Coast Regional Conference, Hotel Sir Francis Drake, San Francisco, March 13-14, 1952; Southwestern Regional Conference, Hotel Tulsa, Tulsa, Okla., April 6-8, 1952; Southern Regional Conference, Hermitage Hotel, Nashville, Tenn., April 20-22, 1952; Canadian National Conference, Hotel General Brock, Niagara Falls, Ontario, Can., April 30-May 2, 1952.

Pacific Coast Electrical Association
Operating Economics Section Conference, Hotel California, Fresno, Calif., March 20-21, 1952; Administrative Services Section Conference, Los Angeles, April 17-18, 1952; Business Development Section Conference, Hotel Huntington, Pasadena, Calif., April 24-25, 1952.

★A&M College of Texas
Annual Conference for Protective Relay Engineers, Department of Electrical Engineering, College Station, Tex., March 24-26, 1952.

American Society of Mechanical Engineers
Spring Meeting, University of Washington, Seattle, March 24-26, 1952.

★Illinois Institute of Technology
American Power Annual Conference, Sherman Hotel, Chicago, March 26-28, 1952.

Oklahoma Utilities Association
Annual Convention, Biltmore Hotel, Oklahoma City, March 27-28, 1952.

Maryland Utilities Association
Lord Baltimore Hotel, Baltimore, April 4, 1952

Rocky Mountain Electrical League
Spring Conference, Shirley Savoy Hotel, Denver, Colo., April 20-22, 1952.

Public Utilities Advertising Association
Annual Convention, Hotel Radisson, Minneapolis, Minn., May 8-9, 1952.

International Organization of Standardization
Triennial Meeting, Columbia University, New York, June 9-21, 1952.

★ Addition this week.

Output Week Ended Dec. 22—7,823,731,000 Kwhr

Weekly Output, Millions Kwhr

1951		1950		1949	
Dec	22 7,824	Dec	23 7,033	Dec	24 5,994
Dec	15 7,667	Dec	16 6,985	Dec	17 5,997
Dec	8 7,444	Dec	9 6,909	Dec	10 5,881
Dec	1 7,476	Dec	2 6,716	Dec	3 5,743
Nov	24 7,157	Nov	25 6,508	Nov	26 5,537
Nov	17 7,333	Nov	18 6,728	Nov	19 5,644
Nov	10 7,396	Nov	11 6,574	Nov	12 5,435
Nov	3 7,319	Nov	4 6,551	Nov	5 5,435
Oct	27 7,234	Oct	28 6,563	Oct	29 5,433
Oct	20 7,149	Oct	21 6,508	Oct	22 5,430

Per Cent Change from Previous Year

	Dec 22	Dec 15	Dec 8
New England	+ 8.1	+ 6.1	+ 4.1
Mid-Atlantic	+ 9.3	+ 7.1	+ 5.9
Central Industrial	+ 8.6	+ 6.5	+ 3.8
West Central	+11.7	+10.5	+ 8.6
Southeast	+14.3	+11.3	+ 8.2
South Central	+20.1	+21.0	+22.0
Rocky Mountain	+13.3	+13.9	+11.3
Pacific Coast	+11.4	+12.5	+10.8
Total United States	+11.2	+ 9.8	+ 7.7

WASHINGTON COMMENT

JESSE MOCK

In a few weeks now Congress will have in hand the President's budget requests for the fiscal year 1953. There is still some guessing as to just what will be the final figures on the federal power program for the year.

Agency heads are in no position to give out final figures on their fiscal 1953 plans. First, because most of them are not sure how their requests will fare in the Bureau of Budget reviews. Second, because it is fairly well-established protocol in Washington to give these figures to Congress before releasing them for publication.

It Is Historical to Ask for More Money

Historically, most of the government agencies can be counted on to ask for more money for the coming than they did for the present year. General idea behind this is that accomplishments of fiscal 1952 will justify expansion of activities for fiscal 1953.

It is generally believed the Budget Bureau will look favorably on construction of power generation facilities in some critical areas. Almost all of these will be in connection with multipurpose projects.

Corps of Army Engineers will probably ask Congress for funds for a series of new starts despite reluctance of the House to permit any during the past year. And the corps, too, will give priority to projects with the larger power features.

Budget requests by the Reclamation Bureau will not vary a great deal from last year. The bureau may ask for some new starts, with emphasis on the power benefits. Some expansion of the work force for the bureau is foreseen.

BPA Would Like to Generate Power

Bonneville Power Administration, heretofore a power marketing agent, is hoping to get into the power generation business if Congress authorizes thermal plants in the Pacific Northwest. But authorization is needed before the agency starts its drive for money to build the plants.

In two regions, government agencies may pare down their requests for funds to build transmission lines below amounts asked last year.

Southeastern Power Administration, suffering setbacks in getting funds for this purpose during the present year, may not ask for any construction funds. This will depend almost entirely on negotiations now going on between power companies and the agency for "wheeling" power to preferred customers.

Southwestern Power Administration hopes to continue its present construction work but will probably ask for no money for new starts. Again this depends on the outcome of "wheeling" negotiations now in progress.

But both these agencies want to expand their working force as their marketing duties increase.

Bonneville, on the other hand, will ask for more dollars for transmission construction next year than it did during the present year. This is to keep up with the additional generating capacity that will come in during the next few years.

Rural Electrification Administration will ask for about the same amount of money to lend for construction purposes as it did during the present year. The agency will also make a drive to build its staff to January 1951 levels. It now has about 120 employees less than it had at that time.

With Congress working at election-year pitch, these requests will not receive the attention they did during 1951. Congressmen hope to finish several months earlier to get in some campaigning of their own. They will try to reach some compromise between efforts at economy and efforts to get money for projects in their own states or districts.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Impulse withstand capability is related almost linearly to the dry arcing distance of the insulator and thereby to the impulse flashover and the low frequency withstand capabilities.

Mutual heating was minimized in the case of two parallel four-duct cable runs carrying a total of 94 Mw by placing them on 6¾-ft centers.

Time-overcurrent relays differentially connected in each phase constitute a widely used form of bus protection.

Weatherproof sound-proofing on a frame structure has proven a better barrier for transformer noise than masonry and can be cheaper than paying the premium for a low db unit.

Capacitor kva to the extent of 50% of the system load in kva made power factor near unity and accentuated out-of-step instablity when a relay operated improperly and started a system disturbance.

(Extracts from Stanford Research Institute Report to U. S. AEC on Industrial Uses of Radioactive Fission Products)

Gamma rays from fission products will penetrate through much greater thickness of material than X-rays from machines and will probably be much cheaper to produce.

Radiation sterilization of food and drugs is expected to be one of the largest industrial applications of gamma-emitting fission products.

Static elimination may prove feasible by mere dependence on beta-rays from fission products.

Long half-life of strontium 90 and caesium 137 lends them promise of importance as industrial radioactive materials.

Radiation from fission products will not produce radioactivity in the material being irradiated, despite common belief to the contrary.

Utility Executives Look At 1952

GEORGE M. GADSBY

President, Edison Electric Institute and
President, Utah Power & Light Co

- **Electric utilities to spend $2.75 billion in 1952**
- **Nearly 9 million kilowatts of new capacity scheduled**
- **Inadequate material allocations may cut steam plant additions 25 to 50%**
- **Annual sales in 1951 advanced 38 billion kwhr**

Construction expenditures of the electric utility companies in 1951 was $2.25 billion. For 1952 they have budgeted an estimated $2.75 billion for construction. However, delays in deliveries of equipment, due to shortage of material, may reduce actual expenditures considerably.

During 1951 7.5 million kilowatts of generating capacity out of the 8 million scheduled were actually installed. This brought the total generating capability of the electric light and power industry to 78.5 million kilowatts at year's end.

Present schedules, including government plants, provide an increase of nearly 9 million kilowatts generating capability in 1952, 12 million in 1953, and 8 million in 1954. Completion of this 3-year program will bring the nation's total generating capability to 104 million kilowatts at the end of 1954—more than twice the total at the end of World War II.

Reduced and inadequate allotments of such critical materials as steel, copper, aluminum, and nickel to manufacturers has already caused some slippages in production schedules and more are impending. Based on conditions in the last half of 1951, there are indications that delay in equipment delivery and steel fabrication will cause a minimum reduction in scheduled additions of 25% and may cut in half the scheduled expansion of steam generating plant in 1952. Possible losses of 4 million kilowatts in scheduled capability by the end of 1952 and 8 million kilowatts by the end of 1953, are thus indicated unless sufficient critical materials are made available to manufacturers and fabricators. In this event, power shortages may be expected in a number of areas in the next two or three years.

Output-wise, over 370 billion kwhr were generated by the electric industry in 1951. In addition 62 billion kwhr were generated by industrial and railway plants for their own use. Thus the grand total of electricity production for the United States in 1951 was 432 billion kwhr. On the other hand world production of electricity is estimated to have reached 1,020,000,000,000 kwhr. Of this the United States generated 43%; Russia, according to a report from Moscow, generated 10%; Canada, 6½%, and the rest of the world, 40½%.

During 1951 the industry added about 1.9 million customers, bringing the total to 46.9 million. The prospect is for a drop in the number of new customers in 1952; the total for 1951 being somewhat less than the 1950 record of over 2.1 million.

At the end of 1951 about 700,000 farms out of 5,384,000, occupied and unoccupied, were without electric service. Of this number about 450,000 were occupied, of which 150,000 have electricity available but are not yet taking service. The estimate is that electric service is now available to about 97% of all occupied urban and rural homes in the nation and that at year end 95% of the occupied rural farm dwelling units have had electric power made available.

Annual sales crossed the 300 billion kwhr mark for the first time in 1951; pushing the total to over 318 billion kwhr. Average residential use of electricity reached a new high of 2,000 kwhr. It was 1,830 kwhr in 1950.

Sales to industrial customers in 1951 increased 13.6%; to commercial customers, 15%. Large industrial users boosted their use of energy over 19 billion kwhr to a total of 158 billion. Smaller power users increased theirs to 58 billion kwhr.

Total revenues of investor-owned utilities this year increased 10% over 1950 reaching a new record of $5 billion. Net income available for dividends and retention in the business decreased from $831 million in 1950 to $814 million in 1951 due to more taxes and inflationary wages and prices.

PAUL B. McKEE

President, Pacific Power & Light Co

- **Regional power situation will remain tight**
- **Relations with Federal Power Groups improving**
- **New capacity of 300,000 kw to cover needs**

Every indication is that the Pacific Northwest will see continued healthy growth in 1952. Sales of electricity will

continue to press against the present ceiling of generating capacity.

Scheduled additions to generating capacity in the Oregon-Washington area, including Pacific Power & Light's 100,000-kw Yale hydroelectric project and Washington Water Power's 200,000-kw Cabinet Gorge development, will just about cover the probable increase in general business requirements. This means that the regional power situation will remain tight.

The Northwest Power Pool, however, has been notably successful in coping with the load-carrying problem, and the full coordination of generating resources has done much to offset the lack of reserves.

Interdependence of the member systems in the western group of the Pool has contributed importantly to progress already made toward better and more businesslike relations with the Federal government as a major power wholesaler in the region.

Five-year contracts recently made by Bonneville Power Administration with the private companies in its transmission area represented a great step forward. They should facilitate the kind of constructive system planning that is so essential to meeting the power needs of a rapidly growing region.

Two-thirds of the power users of Oregon and Washington look to the private companies for their service, and from 1951 to 1955 these companies estimate they will do about $275 million of construction to meet the needs of their 800,000 customers. Local public agencies and the Federal power projects likewise face heavy capital requirements before approaching a normal balance between supply and demand. The weight of our common responsibilities can be expected to stimulate further progress in the development of mutual respect and understanding.

Our own Yale project, on the Lewis River, offers an excellent example of the way non-Federal developments can complement the government's multiple-purpose projects on the Columbia. A great part of the 550 million kwhr to be made available annually from the Yale project will be produced during the winter months when the flow of the Columbia is lowest. This has the effect of firming up equivalent Federal capacity, while reducing our own power purchases.

There is room for similar supplemental developments, for the benefit of all concerned, and we hope to see more non-Federal projects given encouragement.

In view of the tight power situation and the importance of the region's projects to the national defense, the Pacific Northwest should continue to hold a relatively high priority on materials and equipment to expand its output of electricity. Likewise, it does not seem reasonable to expect that additional large defense loads will be put into the region until the present tight power situation is materially relieved.

We expect an increase of about 7% in our system sales of energy to residential and rural and commercial customers in 1952, and between 3 and 4% in industrial sales.

Our construction expenditures in 1951 totaled about $19 million and our 1952 program is estimated at $18.85 million. The Yale project accounts for about $26.45 million of the two-year total.

JAMES B. BLACK

President, Pacific Gas and Electric Co

- **To spend $132 million next year**
- **Shortages in 1952 may reduce home building**
- **1952 sales may reach 14 million kwhr; up 11.1%**
- **To add 235,000 kw in steam capacity next year**

Stimulated by record agricultural crop production, continued high levels of residential building, and mounting defense activities, the company's sales of electricity during 1951 are expected to approximate 12.6 billion kwhr, compared with 11.1 billion kwhr in 1950. Preliminary estimates indicate that next year's sales may reach 14.0 billion kwhr.

Our record peak load to date, 2,891,000 kw, occured in August 1951, and exceeded the corresponding 1950 peak by about 15%. In considerable measure this high summer peak was due to an exceptionally large agricultural load.

Building activity here exceeded expectations this year. New single-family dwellings connected to the company's lines approximated 66,000, exceeding 1950's record of 64,448 units. Credit restrictions and growing shortages of building materials are likely to affect adversely the number of dwellings built in 1952.

Construction associated with the national defense program is steadily increasing due to reactivation and expansion of military establishments throughout our system area. We are also faced with rapidly expanding needs of industrial plants geared to military as well as civilian production.

Additions to electric generating capacity during recent years enabled the company to meet the peaks of 1950 and 1951 with normal reserves. Our construction program originally contemplated the completion of two additional steam generating units aggregating 235,000 kw in the spring and fall of 1952. However, due to delays in scheduled deliveries of equipment and materials it now appears questionable whether the first of these units can be placed in operation prior to the 1952 summer peak. Both units are expected to be ready before the end of next year.

Total expenditures for new construction in 1952 are expected to approximate $160 million. Of this about $132 million will be spent on new or enlarged electric facilities and the balance on gas and other properties. This, com-

pares with 1951 expenditures estimated at about $150 million, of which $110 million was for electric plant investment. Total capital outlays for all departments since 1945 now approximate $800 million.

This very large additional capital investment has not been accompanied by a corresponding increase in earnings because rapidly rising costs and taxes have surpassed the growth of gross revenues. We have been compelled to seek higher rates.

In general the year 1952 will present a changing pattern of economic conditions. There will be variations in the production and prosperity of some segments of industry. Material shortages will hamper and restrict our own and other heavy construction. Purchases of consumer goods may be further affected by credit restrictions, higher prices, and increased taxes.

Despite these conditions, business in Northern and Central California during 1952 promises to be carried on at a high level. Population gains, full employment, defense production, and expanding industrial and agricultural development should assure a continued increase in business activity in this area.

T. E. ROACH

President, Idaho Power Co

- **Government impeding private hydro development**
- **Reserve margin of capacity 12% in 1952**
- **Industrial sales for 1952 estimated up 23.5%**

The business outlook for 1952 in this area is good because of the high demand and high prices for agricultural products and livestock and because the area has a balanced economy as between agriculture, lumbering, and mining.

Principal defense load added in this area is the atomic reactor section at Arco, which is jointly served by Idaho Power Co and Utah Power & Light Co. Idaho Power Co provides two-thirds of the energy required. During 1951 the Calera Mining Co at Leadore, started operation of its very extensive cobalt deposits. Our area also contains the nation's principal source of tungsten and antimony.

Peak load for 1951 is estimated to be approximately 284,000 kw. Good water conditions this year will provide a reserve capacity of approximately 8% over the peak. Peak load for 1952 is estimated as 320,000 kw. In this estimate is the provision for the fourth 25,000-kw electric furnace being installed by the Westvaco Chemical Division of Food Machinery and Chemical Corp at Pocatello. Other loads are expected to increase at about the average long-term rate that is now being experienced.

With the completion of the C. J. Strike hydroelectric plant, consisting of three 30,000 kva units early in 1952, the margin of capacity over peak next year will be approximately 12%.

Percent increases in sales for 1952 over 1951 are estimated as follows:

Residential	6 %	Commercial	4.5%
Farm	4.5%	Industrial	23.5%

Capital expenditures for 1951 are estimated at $22.8 million. The 1952 construction budget estimate is $9.8 million.

Most of our major 1952 projects have Depa approval and controlled material allotments for the first quarter. Minor controlled material allotment is to be slightly less than for 1951 but the present outlook indicates that it will meet the minor project requirements.

Government interference in this area is largely centered in determined efforts by various bureaus to hamper and impede private hydroelectric projects and insistence upon drastic restrictions and conditions in permits for building transmission lines across public domain.

In early December, both of the two large farm organizations of Idaho, the American Farm Bureau Federation and the Idaho State Grange, in their annual state meetings, passed vigorous resolutions in opposition to the Federal government's plans for encroachment.

Idaho Power Co operates under the jurisdiction of both the Idaho Public Utilities Commission and the Oregon Public Utilities Commission. Both state regulatory bodies have a sound and thorough understanding of utility operating conditions and problems. There is no adverse regulatory trend in this area. On the contrary, the commissions have taken vigorous stands against Federal measures which hinder and hamper the private utilities.

PHILIP SPORN

President, American Gas & Electric Service Corp

- **Reserve margin will be tight in 1952**
- **Material shortages will continue in 1952**
- **Construction budget $120 million for next year**
- **All costs will be up, requiring modest rate increases**

We think 1952 is going to be a year of good business. By the end of next year we expect some 1,050,000 new

housing units to be completed, but during the calendar year 1952 the number will be reduced to about 800,000. But probably not much below that. This is significant to the entire national economy and particularly to us in the electric business. Hard goods—automobiles, ranges, water heaters, television sets, radios, driers—will all be built in lesser quantities in 1952 than in 1951 because the materials for them will not be available to the same extent as in 1951. Soft goods, on the other hand, will be up in units produced, but possibly not very much in dollar value of units sold.

But, on the whole, I think we are going to have a year of very excellent business.

It is quite clear that we are going to sell a great deal more large power during the year. Our great problem is going to be how to maintain balance and proportion in the sources of our gross revenue and that means how to maintain the growth in small power, commercial lighting, and residential use.

Specifically, as to what we can expect in demand and energy sales: The power industry has been running about 12% ahead on demand as against a year ago and 13% on output. Our own 1951 figures will be some 12% increase in peak and 18½% increase in output. For 1952 we expect an increase in system demand to 3,040,000 kw, 374,000 kw over 1950, or an increase of 12½%. We also expect a system energy input of 18.1 billion kwhr, an increase of some 2.10 billion, or about 14½%. Our margin of reserve is going to be extremely small in 1952. On the other hand, there is every reason to believe that 1952 will perhaps be the last year of real tightness. We have, for example, scheduled some 800,000 kw of capacity to come on the lines in 1953 and do not expect that our demand will go up by more than 320,000 kw.

Material Shortage to Continue

The problem of getting materials will continue throughout all of 1952. Indications are that the steel situation will ease up along about the middle of the year, but that aluminum and copper, and particularly copper, may take longer than that. Nevertheless, I expect that we will in substance carry out our budgetary construction of approximately $120 million next year as against approximately $98 million which will be the expenditure during the year 1951.

We expect that the cost of almost everything that enters into our business will go up in 1952 and that is particularly going to be the case with steel, aluminum, copper, and manufactured items. Escalation, particularly, is going to play a role in here beyond what we visualized a few years ago.

Of necessity, this is going to have a substantial effect on expenses so that we are going to have a continuing and grave problem of protecting our earnings. We are continuing, therefore, to concentrate on improving our operations and effecting every economy possible. The indications are clear, however, that in 1952 some of the veins of economy that we have been working, and which have become quite thin, may get even thinner. It may not be possible, therefore, to hold off asking for and putting into effect modest rate increases to keep earnings on a continuing sound level.

R. K. LANE

President, Public Service Co of Oklahoma

- **Sales increase approaching 10% expected**
- **Reserve margin to reach nearly 17% in '52**
- **Capital expenditure to be up 69% next year**

Our peak load in 1951 was 306,900 kw with a system capability of 343,400 kw. Reserve was 36,000 kw or 11.9% of the system demand. With the installation of new capacity now under construction, the 1952 system capacity will be 418,400 kw and it is estimated that peak demand will be 358,000 kw. This leaves a reserve of 60,400 kw or 16.9%

Sales increases for 1952 over 1951 are estimated as approximately 7% for residential and rural; 4.5% for commercial and 16% for industrial. The increase in industrial includes the reclassifications, from commercial, which occur when customers earn a better rate and fall into the industrial classification. Our overall sales increase is expected to fall between 9 and 10%.

Revenue this year was divided about 33% residential, 33% industrial, 17% commercial with rural 3% and the balance in "all other." In 1952 industrial will increase to about 35%, the other classes remaining about the same except "all other."

Capital expenditures in 1951 will approximate $10 million. In 1952 they will total $16.9 million divided as follows:

Production	$7,000,000
Transmission	4,500,000
Distribution & General	5,400,000
	$16,900,000

In spite of the increasing difficulty in obtaining material and equipment, we were able to complete approximately 85% of our 1951 construction program. For 1952 the program has been planned to allow enough lead time to obtain deliveries of hard-to-get items. Through the aid and assistance of the Depa, coordinating with manufacturers, essential projects have been kept on schedule.

The company's service area has not received any large defense load. However, there have been increased requirements due to; (a) increasd oil pipe line pumping units, (b) increased military training activities and (c) manufacturers changing to defense production.

In December 1949, Public Service Co entered into a 20-year contract with Grand River Dam Authority, an agency of the State of Oklahoma, for the purchase of electric power and energy from the Authority. In July 1950 this company and the Oklahoma Gas & Electric Co

entered into a 20-year contract with the Southwestern Power Administration, an agency of the Department of Interior, for the purchase, sale, and interchange of electric power and energy. The operations with these two agencies are being carried out under the terms of the contract entered into.

ELMER L. LINDSETH

President, The Cleveland Electric Illuminating Co

- **F.R.B. index to reach 230 in 1952**
- **System peak to increase 15%**
- **Industrial loads to grow 22%**
- **Budget up 25 to 30% over 1951**

Business and industrial activity in the Northeastern Ohio area has been high during the past year. Consequently, demand on us for electric energy, measured both in terms of instantaneous peak load and kilowatt-hour sales, kept rising during the year, at rates higher than the national average.

Northeastern Ohio is again a pivotal center of war production, as it was during World War II, and therefore our industrial load has been boosted by the demands of several large defense customers.

These include Diamond Magnesium Corp, a government-owned primary magnesium plant which was reactivated and has a load of about 42,000 kw; the Electro-Metallurgical Division of Union Carbide and Carbon Corp, with a load of 32,000 kw; and the Cleveland Tank Plant of the Cadillac Division of General Motors Corp, with a demand of 12,000 kw. Naturally, many other plants which were formerly confined to peacetime production are now wholly or partially converted to defense production.

At the moment, the big question mark in our forecast of the 1952 outlook is how far the rearmament program is behind schedule. Even the various agencies of the Federal government concerned with military expenditures seem divided among themselves on this question.

In our opinion, the level of business activity in 1952 will depend on the pace at which rearmament builds up. Obviously, the full effect of this quickening pace has not yet been felt by the economy. After taking these factors into account, we look for the F. R. B. Index to reach a level of at least 230.

Next year we expect our residential sales to go up approximately 14%, commercial to rise about 5%, and industrial to go up approximately 22%.

In 1952 we expect to hit a system peak load approximately 14 to 15% higher than the 1951 peak of approximately 1,050,000 kw.

The most serious immediate problem confronting this company is one we share with practically all other electric utilities, that is, inadequate allocations of materials and equipment for our construction program. This problem is likely to be with us during all of 1952 and for an indeterminate period thereafter.

We added 350,000 kw to our generating capacity in the past two years and we are adding 375,000 kw in the next two years. However, our construction. like that of most other companies, is being slowed down by shortages of steel, copper and aluminum. In 1951 our capital expenditures will total $23 million. Next year our expenditures will increase 25 to 30% to $30 million.

WALKER L. CISLER

President, The Detroit Edison Co

- **1952 new defense loads estimated at 140,000 kw**
- **Next year's peak load to be up 11.4%**
- **Capital expenditures budgeted at $76 million; up 18%**

The general business outlook for this area continues good. Output of automobiles is being curtailed by government allocations of steel. Some unemployment is resulting, but this situation, we believe, is only temporary. As the auto industry converts to a partial defense production economy, an actual demand for skilled workers will be very evident. Detroit and southeastern Michigan which is served by Detroit Edison is expected to have a good level of business prosperity during 1952.

Our estimated peak load for 1951 is 1,750,000 kw which, according to past experience, is expected to occur during the week before Christmas. The estimated peak load for 1952 is 1,950,000 kw, an increase of 11.4% over 1951.

The present peak capability of our own system is 1,895,000 kw. In addition, we have interconnections with Consumers Power Company and other local generating sources. Additional generating capacity now under construction in our own system will become available in early 1953.

In 1951, our gross margin, based upon our own capability, will be about 8%. In 1952, through the continued operation of the interconnected systems on a coordinated basis, satisfactory margins are expected.

It is estimated that our kwhr sales to domestic customers (including farms) will increase 10.5% in 1952 over 1951;

that sales to commercial customers will increase 8.5%; and that industrial kwhr sales will be up about 4% in 1952.

During 1951 Detroit Edison will have spent $65 million for new plant and equipment. The 1952 capital expenditures will total about $76 million, the largest project being our new thermal plant on the St. Clair River near Detroit to be known as the St. Clair Plant. This represents a 17% increase in expenditures over 1951.

We are experiencing difficulties in obtaining materials for plant construction and also delivery of some of our new equipment may be delayed. But, like other power systems, we are making every effort to bring in our new generating capacity according to schedule. The success of this effort will depend upon material supplies to the manufacturers and upon our ability to obtain necessary materials for field construction.

New defense loads added to our system during the fourth quarter of 1951 are expected to amount to about 30,000 kw. The 1952 new defense loads are estimated at about 140,000 kw.

W. C. MULLENDORE

President, Southern California Edison Co

- **Expansion of business to continue on reduced scale**
- **Plan to spend $80 million next year; up 22%**
- **Expected 9% overall sales increase in 1952**
- **Peak load up 9% for 1952; reserve down 5%**

Unhealthy and unsound expansion of business activity will, I believe, continue on a reduced scale during 1952. The country was never in a more dangerous and unsound condition economically than it is today. Most serious aspect of this condition arises out of the unawarness of leadership in the business, labor, educational, and political fields. The self-delusion which was so widespread in 1929 was mild as compared with that which exists today.

On the Southern California Edison Co system we estimate that peak load in 1952 will be about 9%; that our installed capacity will be increased by 7%; and on the basis of these figures, that our reserve kilowatt total may be down about 5%—all as compared with 1951.

Our capital expenditures for 1952 are estimated at $80 million. This represents an increase of about 22% over 1951.

We anticipate increases of sales in 1952 of 9% for domestic, 7% for commercial, 3% for agriculture, 16% for industry, with the sales to public authorities down by 5% and railways down by 21%. This gives us a total overall increase in kilowatt hour sales of about 9% for 1952 over 1951.

J. W. McAFEE

President, Union Electric Co of Missouri

- **To supply up to 72,000-kw interim needs to AEC**
- **1952 reserve to be below normal till new unit comes in**
- **Expenditures next year to top $45 million**

Union Electric System peak load in 1952 will exceed 1951 substantially; possibly by 10%. In addition to this increase, which represents our own load, we expect to supply power to other utilities. The result is a total load materially in excess of normal expectations.

System capability will be increased, during 1952, by the completion of interconnections to adjacent power systems and by bringing into service the first 125,000-kw unit at Meramec Plant. During 1951 reserve has been ample. But 1952 will be below normal until the first unit at Meramec Plant is completed.

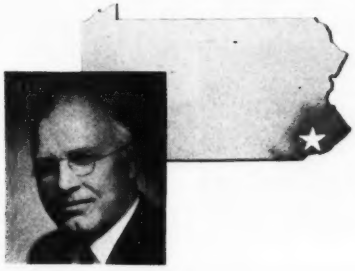
Today's estimates of kwhr sales for next year show increases over 1951 of the following:

Residential and Farm Sales	10.9%
Commercial Sales	7.1%
Industrial Sales	11.9%

Expenditures for utility plant construction in 1951 amounted to approximately $30.3 million. In 1952 we estimate that such expenditures will amount to about $45.7 million; a 51% increase.

The impact of material shortages on the high level demands to support both our plant and distribution programs should level out by the middle or latter part of 1952. The latter part of the year should see improvement.

Because of its industrial diversification, this area has increased its demands for power as industries accepted wartime contracts over and above their normal civilian business. The amount of the increases which may be ascribed to this are not known. However, with respect to new loads that are strictly for defense purposes, 10,700 kw were added this year. In 1952, we expect to add at least 3,200 kw. In addition this company is expected to supply as much as 72,000 kw as its portion of the interim power requirements of the Atomic Energy Commission's Paducah plant.



HENRY B. BRYANS

President, Philadelphia Electric Co

- **Industrial load to grow 14.7% next year**
- **Capital expenditures to double in '52**
- **22 firms plan major defense load additions in '52**
- **Present lull in production temporary**

Next year we expect a peak load increase of 10.2% in the territory of Philadelphia Electric Co and its subsidiaries. The present lull in production is considered temporary.

Our present construction schedules provide for a 6.6% increase in plant capability. Reserve capacity is estimated at 11.1% for 1951, dropping to 7.1% in 1952.

On our system we expect sales for 1952 to increase over 1951 by the following:

Residential and Rural	7.7%
Small Commercial and Industrial	3.1%
Large Commercial and Industrial	14.7%

Contributing to the 14.7% increase in large commercial and industrial load are major defense loads being added by 22 firms in our area.

Electric sales estimates for 1952 are based on a revival of general business activity, which we expect will materialize during the second quarter of 1952. Indicative of this is the fact that large industry here has contracted for some $9.5 million of new electric load during 1951. This is the highest annual performance in the history of the company. This will be reflected mostly in 1952 output. Also included in this amount is the new United States Steel Co plant near Morrisville, Pa., which is now nearing completion and will be in operation next year. In the long run, the impact of this single industry on the economy of this area will be substantial.

Capital expenditures on our electrical system in 1952 will amount to about $69 million compared with $37 million for 1951. The major increase will be for fuel generating stations for which nearly $41 million will be spent in 1952 as contrasted with about $15 million in 1951.

Fuel station expenditures for both 1951 and 1952 included funds for 250,000-kw additional capacity at Delaware Station, the first 125,000-kw unit being scheduled for service before the end of 1952; the second in 1953. Also included were funds for early work on our Cromby Station consisting of two units with a total capacity of 350,000-kw; a 150,000-kw unit scheduled for service in 1953, and a 200,000-kw unit in 1955.

Materials and equipment procurement problems are acute, with capacity and load additions already being scheduled on a hand-to-mouth basis. Further slippage in delivery schedules must be expected to cause a corresponding delay in the connection of new loads.

IRWIN L. MOORE

President, New England Electric System

- **Reserve capacity to reach 16% in 1952**
- **Peak in 1952 expected to top 1951 by 5%**
- **Considerable increase in 1952 business seen**
- **New defense loads will be felt in late '52 and '53**

We anticipate a considerable increase in business in 1952 and a continuation of strong long-term growth trends in residential and commercial loads which stem from higher personal income. We also expect a substantial increase in industrial load based both on natural growth and recovery in manufacturing activity. Important factors in the situation are: Improvement in inventory positions in consumer non-durable goods, particularly cotton and rayon; a possibility also of an improvement in wool, and an intensification of defense orders in the area.

New England Electric System companies expect an increase of about 5% in peak load in 1952 over 1951. This increase can be taken care of by a new 75,000-kw unit at the system's Salem Harbor Plant which came on the line late this fall and by a second 75,000-kw unit at Salem scheduled for the fall of 1952. Reserve capacity for the interconnected privately-owned utilities in the New England area is expected to be somewhere in the vicinity of 16% for 1952.

Estimated increases in sales for 1952 over 1951 for residential and farm customers is expected to be about 9%; for commercial 7%, and industrial 9%.

There has been a large amount of defense production in our area this year. However, in general, it has been the output of existing plants producing their regular line for defense instead of civilian business. Not until late 1952 or 1953 do we expect to be supplying substantial new loads for defense production exclusively to plants that are currently under construction.

Capital expenditures for 1951 were about $35 million and the same amount is budgeted for 1952.

As is the case with most other utilities, New England Electric System companies are fearful that the system's construction program for 1952 may be hampered by material and equipment shortages. Copper, steel, and

aluminum are in short supply and heavy equipment such as transformers, circuit breakers, etc, are requiring long delivery dates. It is expected that this situation will grow increasingly worse rather than improve in 1952.

W. C. GILMAN

President, Florida Power Corp

- **Two month slippage in schedule for 40,000-kw unit**
- **Load for 1952 may exceed 1951 by 12%**
- **Capability will about equal load with no reserve**
- **Seeks rate increase from Florida Commission**

In Florida our business outlook remains good because of the continued increase in population, continued residential construction, and increased interest in Florida as a location for light industries.

We estimate that sales in 1952 will top 1951 by about 12%, in spite of the fact that, except for one major air base, we have not added any defense load in our area.

We expect our peak load in 1952 to exceed the 1951 load by 12%. Our system capability will just about equal our load, with no reserve available, except for what emergency power we may be able to receive from interconnections. With the installation of one 40,000-kw and one 30,000-kw unit next year, we still will be just able to take care of the load. The picture in 1953 will change some, because in that year we are actually adding two 40,000-kw units with another 30,000 to follow in 1954.

Our budget for 1952 calls for expenditure of $29 million compared with capital expenditures in 1951 approaching $18 million.

Availability of steel and copper for transmission lines is becoming critical and may affect our 1952 and 1953 program. Delay in the delivery of structural steel has caused a two month slippage in the schedule for the 40,000-kw unit we expected to put into operation next year.

Government encroachment in our territory is of concern to us in our South Georgia and North Florida operation, due to activities of the Southeastern Power Administration. We already have evidence of their determination to take the REA business away from us.

Electric utilities in Florida have only just this year been placed under State utility regulation. We have submitted the first case before this regulatory body, requesting an increase in our rates in order to meet a portion of the increased cost we have been subjected to continuously since 1945.

EARLE J. MACHOLD

President, Niagara Mohawk Power Corp

- **Negative reserve capacity seen in 1951 and 1952**
- **Defense load to be 440,000 kw in 1952**
- **Capital expenditure to be $64.5 million in 1952**
- **Higher efficiency of new plant may offset rising costs**

On our system in 1952 we hope that rising cost and increased taxes will be offset by the greater efficiency of our more recently built generating plants and by increased earnings expected from the extension of natural gas throughout most of our gas service areas.

The peak load on the Niagara Mohawk Power Corp system for 1950 was 2,171,000 kw. In 1951 our estimated peak load is 2,509,000 kw and for 1952, 2,730,000 kw. In 1951, our estimated capability was 2,389,000 kw and in 1952, with average stream flow, 2,627,000 kw.

The negative reserve capacity in 1951 and 1952, indicated by these differences between our capability and load, is due to the fact that we are supplying the Aluminum Company at Massena, N. Y., 140,000 kw for stock piling aluminum from our reserve capacity, and from other sources interconnected with our system.

Major defense loads in our area contributed 294,000 kw in 1951 and 440,000 kw in 1952.

In 1952 we anticipate that sales to various classes of consumers will grow as indicated in the following tabulation:

	1952 1,000 kwhr	1951 1,000 kwhr	% Increase
Farm	291,555	272,873	6.7
Residence	1,593,477	1,457,181	9.3
Commercial	1,427,100	1,335,054	6.9
Industrial	10,806,049	9,561,273	13.0
All Other	1,471,816	1,487,050	−1.02
	15,589,990	14,113,431	10.4

We estimate that in 1951 we will have capital expenditures aggregating $57,148,000 and that in 1952 this will be increased to $64.5 million. At the moment we are obtaining our necessary materials and equipment and have orders placed well through 1952 for much of our anticipated needs. To what extent Washington will permit expansion and allocation in 1952 is, of course, not determinable at the present time.

As to the threat of public power development in the territory of the Niagara Mohawk system, the industry is, of course, familiar with the proposed St. Lawrence development and with the three sets of bills pending before the present Congress which would authorize, respectively, the redevelopment of Niagara Falls for power purposes by the Federal government, the State of New York, and private enterprise.

Demonstrated Savings Experienced With Compensated Secondary Metering

Comparison of basic cost indexes for primary metering and compensated secondary metering for the same load conditions shows how transformer-loss compensators save money

GEORGE B. SCHLEICHER, Meter Division, Philadelphia Electric Co

Metering of loads of primary customers on the low voltage side and compensating the metering to include transformer and line losses effects savings in installation costs and use of scarce materials. Other advantages of this method include relative freedom from lightning disturbances on the low-voltage side and a reduction in space requirements.

Main component of the method is the transformer-loss compensator*, manufactured by the Eastern Specialty Co of Philadelphia.

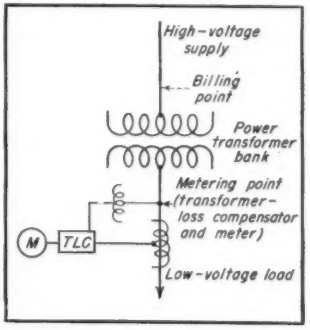
This device differs from the compensating meter** in that it causes the same meter which measures the load to include transformer losses. On the other hand, the compensating meter measures the losses separately and its readings must be added to those of the load meter to obtain values as of the high voltage side. The meter and transformer-loss compensator are tested with the same meter-test equipment as the regular watthour meter.

An Alternate Method . . . Developed by Philadelphia Electric Co, the transformer-loss compensator has been improved to be applicable also to varhour meters***. It provides an alternate method to metering on the high voltage side, with billing meter accuracy. It is of particular value today because of growing shortages of materials and increased delivery time for high-voltage instrument transformer equipment.

Savings that can be effected by this method of metering are determined by comparing the basic cost index for both primary metering and secondary metering. Basic cost indexes for two-element and three-element metering at the more common voltages are given in accompanying illustrations.

Cost Components . . . Primary metering cost index for a single meter installation includes cost of separate current and potential transformers without primary potential fuses.

Additional factors such as cost of the meter, test switch, meter panel, and secondary conductors from instrument transformers to metering point are included. Instrument transformers are indoor types up to and including 13.8 kv; outdoor types are used for higher voltages. Demand metering costs are not included because practices vary widely and because these costs will be the same regardless of whether primary or secondary metering is used on a single-meter installation. Labor costs include tests of instrument transformers and meters, wiring and installation of the meter panel, and installation of secondary conductors from instrument transformers to meter panel.



LOW-SIDE METERING of primary customer may be done through use of transformer-loss compensator

Not included in the basic cost index is cost of installing instrument transformers, cost of their primary connections, and installed cost of conduit from instrument transformers to meter panels. These costs vary in different parts of the country, between metropolitan and rural locations, and with requirements of individual utilities. In some cases this part of the work is done by the customer. It is estimated that for the inclusion of these items, multipliers from 1.4 to 2.0 may be applied to the basic cost index as correction factors.

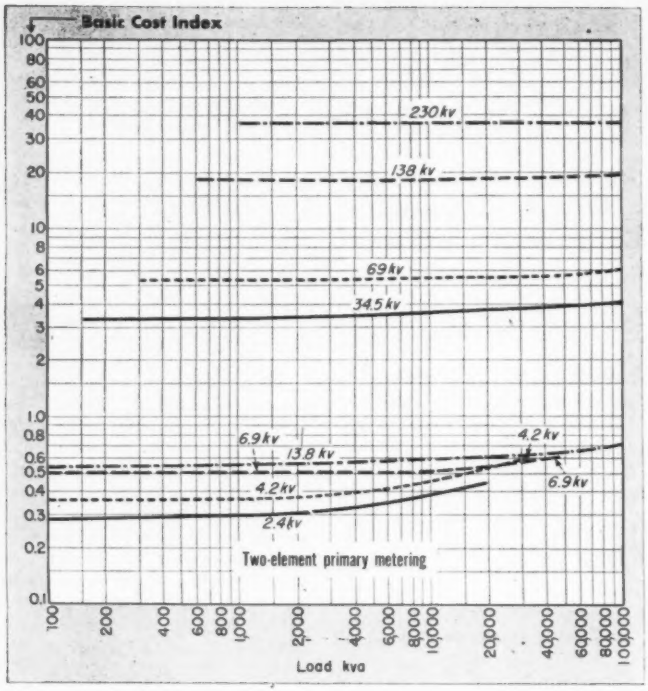
Secondary basic cost index includes the same items as does primary metering at the same voltage, plus the cost of the transformer-loss compensator, the cost of obtaining loss data, calculation of compensator setting points, and adjustment and installation of the compensator. These increment costs are independent of metered voltage. They approximate $340 for a two-element installation, and $440 for a three-element installation (0.34 and 0.44 in the basic costs indexes).

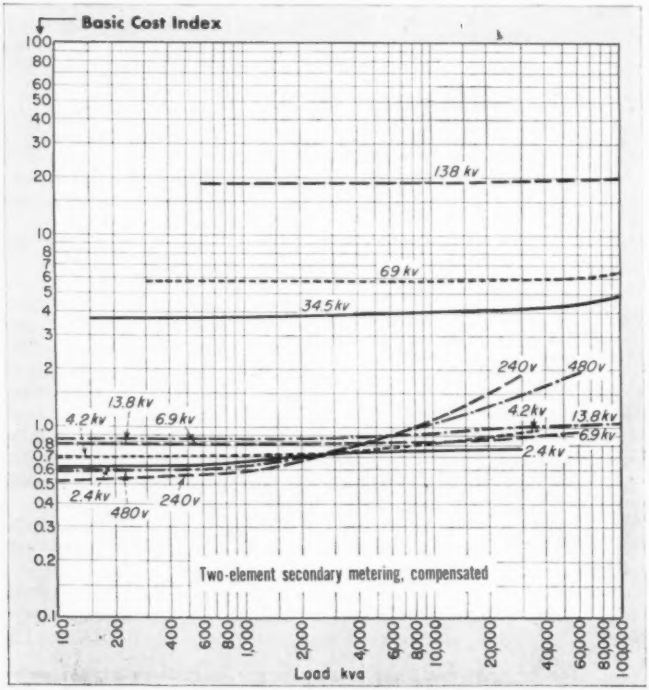
Special Considerations . . . For installations that require more than one primary metering equipment, basic cost index is multiplied by the number of metering equipments required. Similarly with secondary metering, basic cost index is multiplied by the number of transformer banks to be metered. If the number of metering equipments, primary compared to secondary, is different, the difference between demand metering costs should be taken into consideration.

Additions may be made to the basic cost index to meet special require-

* "Loss Compensators," Electrical World, March 12, 1951, p 136, and "Compensated Transformer Loss," Electrical World, July 19, 1947, 95-97.
** "Primary Energy Measured on Low Side by Compensating Meter," Electrical World, July 1, 1933, p 27-31.
*** AIEE Proceedings Section T1-182.

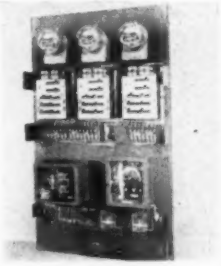
Use of cost indexes is shown on following pages →





ments. These may include varhour meters, reverse meters, or substitution of a kva meter for the watthour meter. Values in the accompanying table include equipment, test, and installation costs to be added to basic cost indexes if any of these features are required.

Typical examples included in this article illustrate the use of basic cost index curves for determining savings effected by transformer-loss compensators. A general analysis of these curves indicates that for new installations sizable savings occur for primary voltages above 13.8 kv. For lower primary voltages, primary metering installations usually will cost less. However, where an existing installation at a lower voltage may continue to serve merely by the addition of a compensator, the higher meter equipment cost may be justified by the saving in new primary equipment and construction, even for primary voltages of 13.8 or 6.9 kv.



METER PANEL for three 5,000-kva delta-delta banks, metered at 6.9 kv, 3 phase, 3 wire, compensated to dual 69-kv, 3-phase, 3-wire supply

Example I—$8,100 Saved

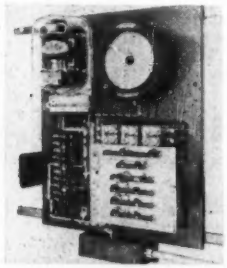
Type of Installation	Cost Index
Two-element primary metering 15,000 kva at 69 kv, two services	$5.4 \times 2 = 10.8$
Two-element secondary metering Compensated—5,000 kva at 6.9 kv, three transformer banks	$0.85 \times 3 = 2.55$
Difference	8.25

The difference, multiplied by 1,000, is $8,250, from which must be subtracted the difference in cost and tests between a two-element totalizer and the four-element totalizer required for the secondary installation. This difference is about $150, so that the net saving is about $8,100.

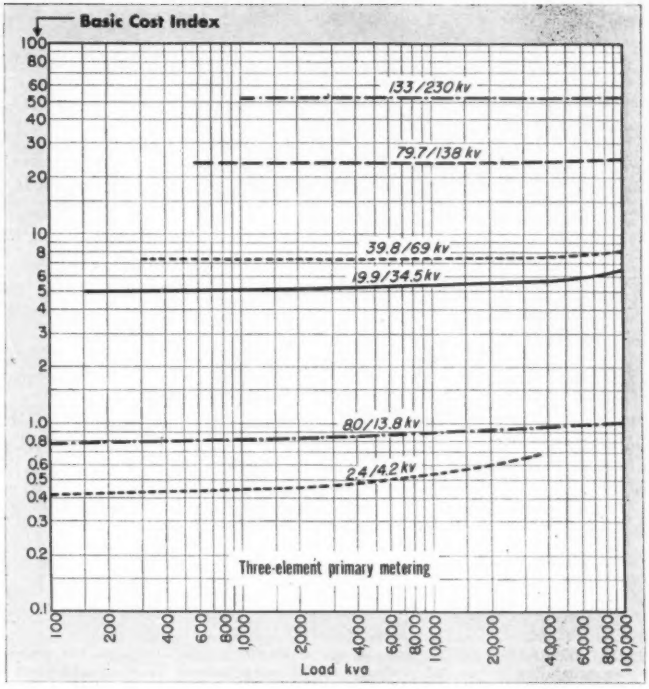
Special Requirements Require Additions To Basic Cost Index

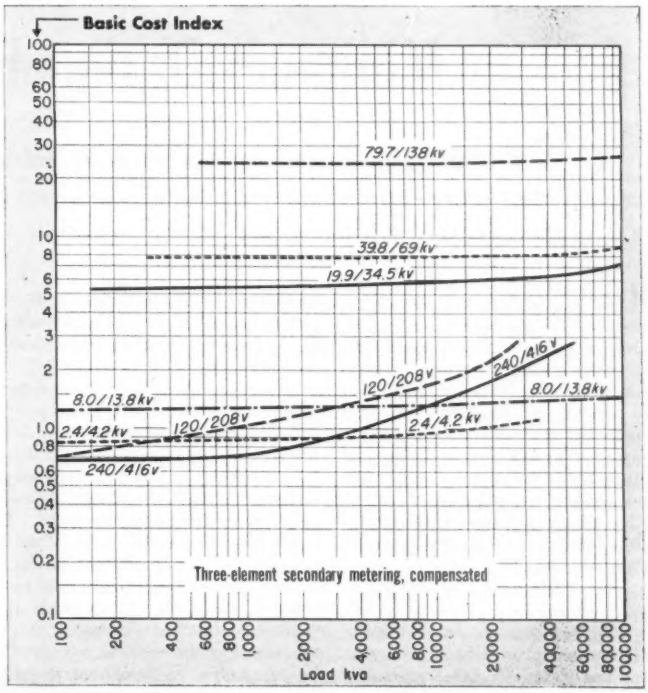
	Var-hour meter	Reverse Watthour meter	RI Kva meter
Primary metering			
Two-element unit	0.12	0.08	0.37
Three-element unit	0.16	0.10	0.47
Secondary metering with compensator			
Two-element unit	0.46	0.42	1.04
Three-element unit	0.60	0.54	1.31

Other Uses . . . For interconnection metering installation, the transformer-loss compensator provides a means for remote metering. Equipment may be located in a terminal substation on the low-voltage side of the transformer bank that supplies the transmission line. It can be compensated to a remote point, such as a state line or a territorial boundary, merely by adjusting the compensator to include line losses with transformer losses. Compensators may be connected to subtract losses; reverse metering may be added if required.



METER PANEL for 1,500-kva installation, metered at 2.4/4.2-kv, 3-phase 4-wire wye, compensated to the 34.5-kv, 3-phase, 3 wire supply



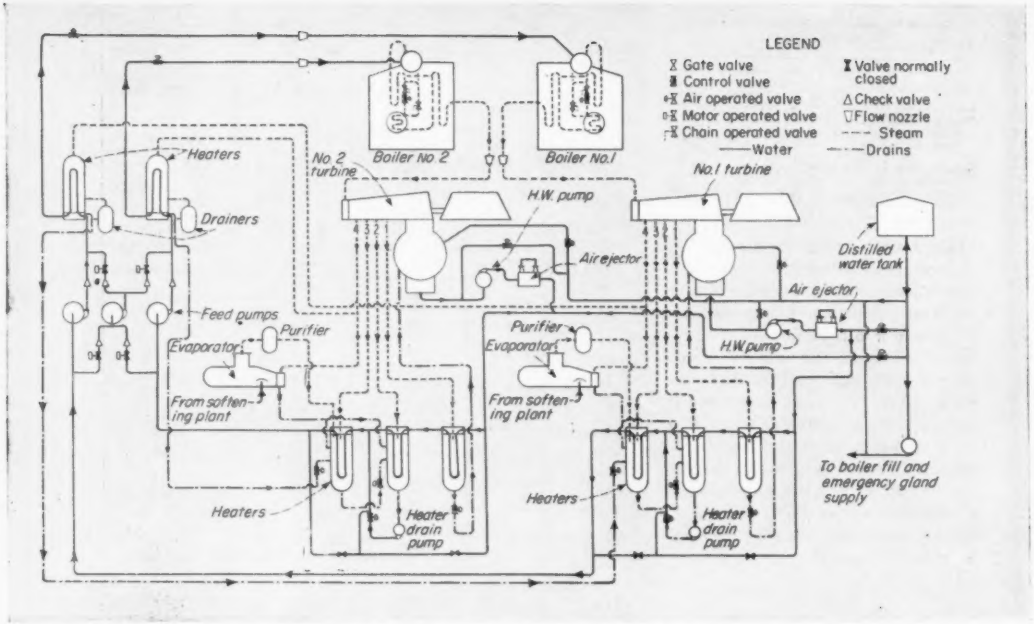


Example II—$2,530 Saved

Type of Installation	Cost Index
Two-element primary metering, 1,500 kva at 34.5 kv	3.4
Three-element secondary metering. Compensated—1,500 kva at 2.4/4.2 kv	0.87
Difference	2.53

The difference, multiplied by 1,000, is $2,530, the approximate saving of metering on the low voltage side and compensated to the high voltage side.

For both examples, additional savings result if that part of the installation work not included in the basic cost index is done by the utility. If the customer does this work, these additional savings accrue to him.



SIMPLE OPERATING SETUP marks design of 40,000 kw capacity generating station at Milesburg. Individual boilers and turbines are arranged as entirely separate unit systems linked only at condensate surge and by spare feed pumps

Minimum Design For Reliability

Simple basic operating arrangement combines individual boilers and turbines in two separate unit systems within convenient but low cost structure. Resulting design is inexpensive yet easy to operate with a minimum force

Rapid load growth and the expiration, in 1950, of contracts for the purchase of energy to supply most of its Keystone areas in northern and central Pennsylvania forced West Penn to fortify the power supply in the area with a new generating station.

Study showed that a station of about 40,000-kw capacity would meet the needs of the eastern and western Keystone areas if connected by a 132-kv line with a small existing station at Ridgeway which supplied about a quarter of the entire load of the two Keystone areas.

Milesburg was chosen as the site for the new plant because strip coal was readily available there from nearby operations. Moreover, a constant flow of low temperature water was available from Spring Creek, and it was centrally located in the load area.

The installation of this station, with respect to the company's other generating stations, and power demands in the Milesburg vicinity, dictated the installation of two boilers and two turbines for reliability of service, instead of one large unit.

To minimize investment costs the semi-outdoor type of construction was selected for the new station. Design effort was directed at obtaining a "basic minimum" or "bare bones" station that had the required reliability yet economized on items that would increase cost without contributing to increase in efficiency or economy.

Two sides of each boiler act as station walls. Outer station walls of insulated aluminum siding were used in place of more costly masonry. Air heaters and dust collectors as well as induced and forced-draft fans are entirely outdoors.

The turbine area is enclosed with panel sections which can be removed for turbine and generator maintenance. A gantry crane is located outside and above this turbine enclosure for servicing the turbo-generators. With the exception of the revolving water screens and the coal conveying system, all other equipment is housed

Ratings of Major Equipment At Milesburg Station

Boilers—(1) Continuous capacity 210,000 lb/hr at 875 psi and 910F at superheater outlet with 388F feedwater

Compressor—Station Air: (1) 12 x 13 in, 275 rpm, 125 psig 335 cfm
Control Air: (2) 7 x 7 in, 400 rpm, 100 psig

Condenser—(2) Each 13,000 sq ft, two pass, non-divided water box surface condensers

Conveyors—Designed for 150 T per hr

Crusher—(1) 150 T per hr, ring type

Distilled Water Tank—54,000 gal

Exciter—Spare—250-v, 100-kw compound-wound

Evaporator—(2) Vapor output 750,000 lb per hr

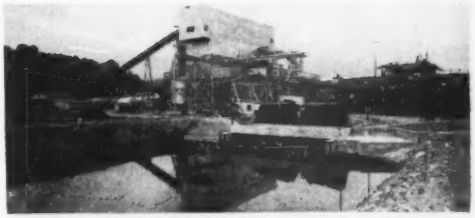
Fans—Forced Draft—(2) 1180 rpm, 68,600 cfm, 152 hp
Induced Draft—(2) 880 rpm, 108,700 cfm, 289 hp

Filter—Oil—(1) Dry type turbine oil conditioner. Storage capacity 160 gal; Filtering capacity 270 gal per hr

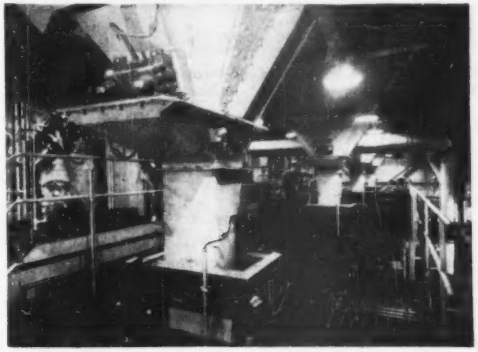
Turbo Generators—(2) 20,000-kw, 85% pf AIEE-ASME preferred standard for throttle steam conditions of 850 psig, 900 F total temperature and 1.5 in. Hg absolute exhaust pressure Turbo-Generator heat rate 9,680 BTU/kwhr at 23,616 kw

Pulverizers—(4) 25,550 lb per hr

Pumps—(2) Ash—1600 gpm, 135-155 TDH
(2) Ash Sluice—1000 gpm, 305 TDH
(3) Boiler Feed—545 gpm, 2760 TDH
(2) Circulating Water—15,000 gpm, 26.35 TDH
(2) Condensate—500 gpm, 465 TDH
(1) Distilled—300 gpm, 190 TDH
(2) Screen Water & Fire—650 gpm, 275 TDH
(2) Service Water—2,000 gpm, 120 TDH
(2) Treated Water—40 gpm, 240 TDH



MILESBURG STATION follows semi-outdoor pattern. Two sides of each boiler act as station. Traveling crane straddles turbine area. 132/44-kv switchyard is on right background



BURNER DECK is located just below bunkers. Note the electric-vibrators located on hoppers above the coal gates

Keeps Milesburg Cost Low

H. A. P. LANGSTAFF, Chief Electrical Engineer
R. A. MYCOFF, Superintendent, Milesburg Station
West Penn Power Co, Pittsburgh, Pa.

within the main power house building. These and other innovations resulted in a plant cost of approximately $168 per kw of net plant capability (42,000 kw).

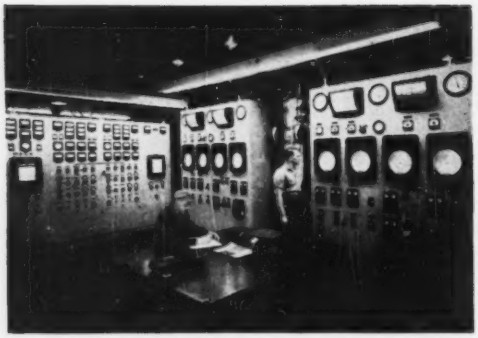
Operating Setup . . . Layout of the station from the operating standpoint is exceedingly simple. Individual boilers and turbines are set up as unit systems. Except for a tie-in at the condensate surge and the manner in which the spare feed pump is located, the unit sections are entirely separate.

With one unit operating at full load, steam is generated in the boiler drum at 965 psi. After passing through the superheater and desuperheater, steam leaves at 895 psi. Its final temperature of 900 F is held constant by a two-element control using air flow and final steam temperature as influence mediums. But the control may be by-passed when necessary by a by-pass control valve and a shutoff valve ahead of the air operated valve.

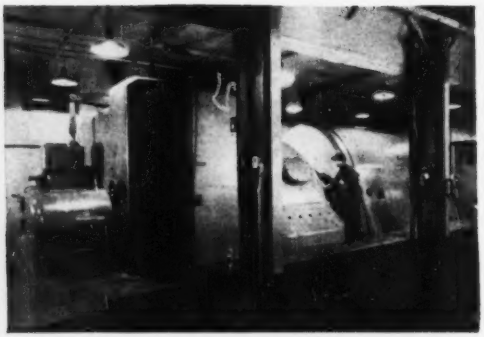
Steam enters the turbine throttle at 865 psi and 900 F. The turbine has four bleed points, with approximately 75% of the total steam passing to the condenser. The condensate pump has sufficient discharge head to force the water through the air ejector condenser and three lower pressure heaters and still have ample pressure to prevent flashing at the feed pump suction. No deaerator is provided in this system as the deaerating hotwell of the condenser is sufficient to remove all free oxygen.

Three boiler feed pumps are supplied for the two units, No 1 normally supplies water for No 1 boiler, No 1-A acts as a spare and No 2 normally supplies water for No 2 boiler. No 1-A pump may be placed in service immediately for either boiler by use of motor-operated valves at the suction and discharge lines of No 1-A feed pump leading to either of the boilers. The main feedwater flow meters operate the pump leak-off valves when the water flow falls to a given point to prevent the pumps from over-heating. For this reason, No 1-A pump is never operated in parallel with either No 1 or No 2 pump nor can No 1 pump supply water to No 2 boiler or No 2 pump to No 1 boiler.

Each system is provided with its



CONTROL AREA is bounded on three sides by panel boards. At right are turbine controls, at the left electrical controls



TURBO-GENERATORS each rated 20,000 kw, 85% power factors are located in area outside the main plant structure

Nearby coal supply and cooling water influence plant location

own evaporator which produces make-up to the system by means of steam bled from No 4 bleed point. One distilled water tank provides condensate surge and storage for both sections. As there are no deaerating heaters in the system, the condensate control is greatly simplified with the hotwell levels controlling the flow from the system to the storage tank, or the flow to the condensers from the storage tank.

In case of extreme low water in either hotwell, an air-operated valve actuated by a solenoid will trip open permitting water to flow directly from the distilled water tank to the condensate pump suction. But the operation of this valve is avoided whenever possible as it permits water which may be contaminated with oxygen to pass directly to the system.

Control Layout . . . Control panels for the boilers, turbines, auxiliaries, and electrical equipment are located in a control room at the center of the building. Feed pumps, pulverizer feeders, and other essential auxiliary equipment are readily accessible from this point.

Simplicity of the operating setup has considerably reduced the number of instruments and controls usually required. For instance, only two flow meters per unit are necessary at the feed water meter. These are not only for the water level control but for the feed pump by-pass as well. All air operated controls are protected by an automatic reactivating drier which reduces the dew point of the air to 20 F.

Coal Handling System . . . Facilities are available at the Milesburg Station for receiving coal both by truck and by rail. Coal can either be placed in storage or sent directly to the bunkers in the station via a conveyor system.

Storage coal is leveled and packed by a bulldozer. Coal to be sent to the station bunkers falls by gravity into a track hopper and is fed to the first of five conveyor belts by magnetic vibrators. These vibrators can be controlled through an adjustable rheostat to feed just a trickle of coal to the belts, or up to a maximum of 150 tons per hour.

The first crushing of the coal takes place in a hammermill crusher that reduces run-of-mine coal to a maximum of one inch.

The self-propelled tripper on the last belt is actuated by the moving conveyor. It is equipped with two self-sealed discharge chutes and can be used either for distributing the coal to the bunkers in layers or locked in a fixed position. The storage capacity of the bunkers is approximately 900 tons—which is equal to nearly two days' supply at full load operation.

From the bunkers the coal is gravity-fed to the feeder crushers and then to the pulverizers. There are two feeder crushers and two pulverizers per boiler.

Air For Combustion . . . Double inlet fans with backward curved blades supply air for the forced draft. There is one fan per boiler. Both are located outdoors. Air entering the fan housing is forced up through a counterflow air heater of the tubular type, single pass design. Gas from the boiler flows through the inside of the tubes and air flows over the outside. Counterflow insures maximum temperature difference between gas and air, resulting in highest heat transfer efficiency.

Ash Handling System . . . There are two separate ash disposal systems—with common sumps and pumps. One handles the fly ash collected by the mechanical precipitator and the other takes care of the larger ash particles that are removed from the bottom of the boilers.

Ashes are forced from the hopper under each boiler by five sets of high pressure sluicing jets, positioned to flush the ashes through sluiceways to the sump where they are pumped to a settling basin 1800 feet from the station.

Fly ash collects in hoppers under the mechanical collector and is removed by a water jet vacuum system that discharges them into the ash sump and settling basin.

Control Air . . . Two air compressors supply the air for the pneumatic control system. Regulating valves maintain a constant pressure of 28 psi in one system, 40 psi in another, and 50 psi in a third. An air receiving tank assures a constant flow of air. Air entering the control system first passes three filters. One is at the suction of each compressor and the other two are in series after the receiving tank.

The compressors cut in and out automatically with one compressor normally maintaining the demand for air in the system. If air pressure drops below a certain point the second compressor cuts in. If both control air compressors cannot handle the load, the station air compressor automatically comes to their assistance. The station air system is supplied by a separate compressor of 335 cfm capacity and 125 psig maximum pressure.

Spring Creek is the main source of water supply for the station and provides 55 F water in summer. Water is used directly from this creek for condenser cooling and raw water service. Some water is filtered and softened for evaporator feed, drinking, and wash purposes.

Generation . . . The initial installation at Milesburg consists of two standard generators, each with a rating of 20,000 kw at 85% power factor and 0.5 pounds hydrogen pressure; 13.8 kv; 3600 rpm. The station is arranged for the future addition of a standard 40,000-kw unit.

The generators' leads are 1,000,000 cir mil cotton-wrapped, 25/64 in. wall of insulation, tape and asbestos braid cable supported on ebony wood cleats and Uni strut-type brackets. The generators are protected by the usual surge protective type SV arresters and capacitors. Each is connected to ground through an indoor-type 150-kva distribution transformer having a voltage rating 13.2 kv/240-480 volt, with a loading resistor having a rating of 1.16 ohms, 220 amps, continuous 60 C rise.

Each generator has its own direct-connected 115-kw, 250-volt main exciter and 2.5-kw, 125-volt pilot exciter. A spare 100-kw, 250-volt dc, 900 rpm motor-driven exciter with shunt-wound pilot exciter is provided for use with either generator or both, if necessary.

Auxiliaries . . . Generator leads from each unit are connected through disconnect switches to separate 3,000-kva, 13.2-2.3-kv, 3-phase self-cooled delta-delta transformers in the switchyard. Each transformer supplies a station auxiliary bus—one for each unit—which are interconnected through their respective switchgear. Other interconnecting cables extend outdoors to a reactor installed near the 25,000-kva, 132/44-kv auto-transformer and connected to the 5,700-kva tertiary winding of this transformer. This provides the necessary emergency supply for the starting of the plant in case of a complete shutdown. The reactor limits the short circuit duty on the station auxiliary switchgear whose rating is 50,000 kva.

The 440-volt station auxiliaries are supplied through a double ended unit-type substation which contains two 500-kva A.S.L., 3-phase, 80 C rise dry-type, 2.4-kv/480-volt delta-connected transformers. Type DA-50, 800 amp, manually-operated circuit breakers are provided for the transformer and tie connections, and type DK-25, 600 amp, manually-operated breakers for the individual feeders.

Station lighting and other miscellaneous circuits are fed from a lighting distribution center consisting of four sections of metal-enclosed switchgear housing two 112.5-kva, 2400/208/120-volt dry-type transformers equipped with casters for easy removal from switchgear. The high side is protected with 7.5-kv disconnecting type fuses; circuits are controlled by type AB circuit breakers; and one automatic transfer switch for emergency lighting is provided.

The 2.3-kv station auxiliaries are controlled from two metal-clad switchgear centers housing 5-kv air circuit breakers having an interrupting capacity of 50 mva, all 125 volt electrically-operated and complete with instrument transformers, relays, insulated buses, etc.

Motors . . . Coal pulverizers are driven by 200-hp induction motors, 2.3 kv, 900 rpm drip-proof squirrel-cage type, 40 C rise, class "A" insulation with boiler house impregnation. The three boiler feed pumps are driven by 500 hp, 3600 rpm, 2.3-kv, 40 C, open drip-proof squirrel-cage induction motors. The two induced draft fans are driven by 300 hp, 2.3-kv, 900 rpm, horizontal, totally-enclosed fan-cooled squirrel-cage induction motors with full class "B" insulation treated for power house service and equipped with thermo-guard protective devices. The two forced draft fans are driven by 150 hp, 1200 rpm, 2.3-kv, horizontal, totally enclosed, fan-cooled squirrel-cage induction motors with class "A" insulation. These are equipped with Spencer disc thermostats.

Lighting . . . General lighting throughout the plant is provided by standard incandescent units with simple reflectors. The control boards are illuminated by fluorescent reflector units supported from the control room ceiling. Emergency lighting is provided when needed.

Communication . . . Communication inside the power station is provided by regular telephone circuits and a public address system. The telephones afford means of communication between points inside the station, and with the outside by dialing the line desired. The public address system is used for paging and also communicating between major operating points in the power house. A carrier current channel is furnished in connection with the 132-kv transmission system for communication with Ridgway. Provisions are made for future installations of telemetering between the power station and dispatching points.

132 Kv-44 Kv Substation . . . The energy from each generator is transformed to 44 kv through its own 25,000-kva 3-phase forced-oil forced-air-cooled, 44-kv wye and 13.2-kv delta transformer, connected to the main 44-kv bus in a 4-bay outdoor switching structure whose facilities control four 44-kv feeders. These feeders are interconnected into the existing 44-kv system at Bellefonte and State College.

One circuit supplies energy to a 5,000-kva transformer bank providing a feed into the existing 22-kv system and to a 1500-kva bank supplying the low tension distribution system now being changed to 8 kv. There is one 4500-kva, 44-kv outdoor capacitor bank, temporarily installed, and automatically controlled by its own oil circuit breaker and fed through protective fuses.

A 25,000-kva, 132/2.3/44-kv, 3-phase, forced oil, forced air-cooled auto transformer is connected to the 44-kv bus. This supplies the 61-mile transmission 132-kv line to the Ridgeway station.

The 44-kv switchgear is rated at least 500 mva. Solenoid-operated breakers, 37 kv, removed from service elsewhere have been used for all circuits, except that a high-speed pneumatic-operated 44-kv breaker controls the 132/44-kv auto-transformer.

How to Apply Step-Type Distance Relays

Errors in ohmic measurement can be corrected by installation of jumpers between like phases where two lines are parallel into a six-wire circuit. Curves show where to locate jumpers for maximum effect with minimum number

H. P. DUPUIS and T. E. HEDIN
Commonwealth Associates, Inc,
Jackson, Michigan

With heavier loading of transmission lines and the need for additional circuits, an economic solution may be to parallel two existing lines into a six-wire circuit thus relieving breaker positions for a new circuit. To avoid excessive exposure, the lines to be six-wired should be on double circuit structures or should be closely parallel for all or nearly all of their length. Phase faults on such circuits seldom involve more than two or three conductors of one line and if step type or distance relays are used, they will not measure the correct distance, unless the lines are jumpered.

Step-type or distance relays measure true ohms only if the relay receives all of the current that causes the voltage drop measured.

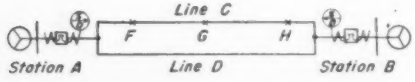


FIG 1—JUMPERS between like phases are necessary if faulty relay operation is to be avoided when two existing lines are parallel into a six-wire circuit

For a typical six-wire circuit, Fig 1, phase faults involving only two or three wires as at F, G, and H on Line C, the relays will not measure true ohms since they do not measure the fault current in Line D. At some fault point between F and G, the current in Line D will be zero and at that point, the relays will measure the true impedance of a three-wire circuit.

Errors in Ohmic Measurement . . . Fig 2 shows a graphical comparison of actual and apparent ohms as measured by a reactance or impedance step-type relay at Station A. These curves are based on an equivalent generation of 250 mva at Station A and 1,000 mva at Station B. The point at R is where the current in Line D is zero and the relays at Station A measure the true impedance of a three-wire circuit.

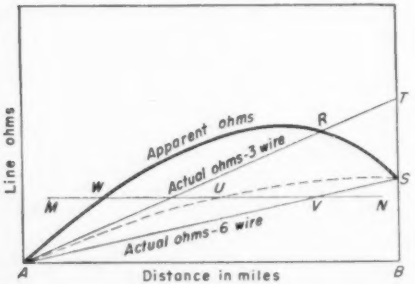


FIG 2—ACTUAL AND APPARENT OHMS measured by relay at Station A, Fig 1, when generation at A is 250 mva and generation at B is 1,000 mva shows how relay operation will be faulty. When breaker at B opens apparent ohms will be as shown by dashed line

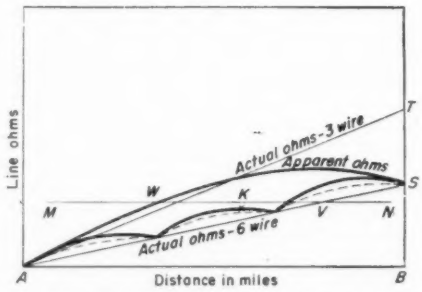


FIG 3—JUMPERS REDUCE ERROR as shown by change in curve of apparent ohms when two sets of jumpers are installed

Relays at each end of the line must have a Zone 1 setting of 80 to 90% of the six-wire impedance or reactance in order not to overreach for faults in the adjacent line section. The Zone 1 setting can be represented by the line M-N. It follows that any value of ohms above this line will appear to the relay as a Zone 2 fault. The instantaneous protection of Zone 1 may be reduced from 90% of the line as at V to about 20% of the line as at W.

Fig 3 shows the actual and apparent ohms for the relays at Station A with equal equivalent generation at each end of the line; and the effect of two sets of jumpers in reducing the curves of apparent ohms.

The above discussion is based on breakers at both ends of the line being closed. After the breaker opens at Station B, the curve of apparent ohms measured by the relays at Station A collapses as shown by the dashed lines, Fig 2 and 3. With the far end breaker open, the curve of

To Six-Wire Transmission Lines

apparent ohms will be below the line A-T and will not be above the point S. This reduces the error of the first zone reach from V to U, Fig 2.

With lines of approximately equal impedance, the calculations for determining the curves of apparent ohms can be greatly simplified by using the following formula:

$$\text{Apparent ohms} = Z_c + X\,\frac{K_2 - K_1 X}{K_3 - X}$$

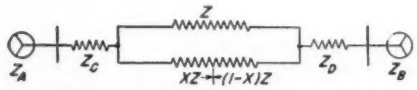


FIG 4—CALCULATIONS of apparent ohms can be simplified by using equivalent circuit

Referring to the equivalent circuit of Fig 4:

$$K_1 = Z_A + Z_B + Z + Z_C + Z_D$$
$$K_2 = K_1 + Z_B + Z_D$$
$$K_3 = 1 + (Z_B + Z_D) - 2/Z$$

X is the decimal or fractional part of the three-wire impedance, Z, at the point being calculated.

Z_A and Z_B are equivalent generation in ohms at Stations A and B.

Z_C and Z_D are the impedances of three-wire end sections and may be zero if the line is six-wired for the entire length. When calculating the curves between jumpers as in Fig 3, the values of Z_C and Z_D become the six-wire impedance between the station and the last set of jumpers on the circuit in question.

Similarly, the value of Z may be the three-wire impedance of the entire line or the impedance of the circuit between jumpers.

Distance Relays . . . Distance relays, such as Westinghouse Type CZ, have a much greater time delay for phase faults involving only two or three conductors of a six-wire circuit. The variation in operating time of a CZ relay using a typical setting is shown in Fig 5. It is evident that with an operating time as at G, it may be very difficult to retain selectivity with the backup relays. However, this condition can be mitigated to some extent if the far end breaker is fast opening. The operating time with the far end circuit breaker open is shown by the dashed line in Fig 5.

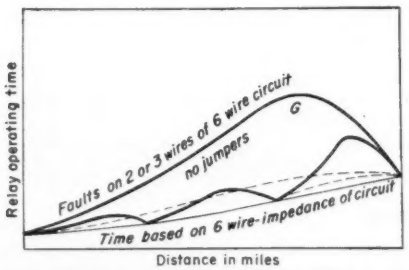

Relay operating time
Faults on 2 or 3 wires of 6 wire circuit
no jumpers
G
Time based on 6 wire-impedance of circuit
Distance in miles

FIG 5—OPERATING TIMES of CZ relay using typical setting will vary for three-wire fault on six-wire transmission line jumper installations

Induction Type Relays . . . Operation of induction type phase or ground relays is not seriously affected by faults involving only two or three conductors of a six-wire circuit. As shown in Fig. 6, the fault current at intermediate points is increased by the use of jumpers but satisfactory relay operation can be obtained without jumpers.

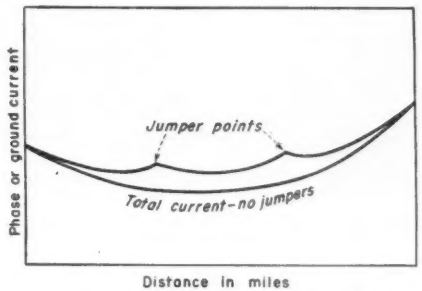


FIG 6—JUMPERS INCREASE phase or ground fault current on three wires of six-wire circuit and variations depend on number and locations of jumpers

Conclusions . . . Step-type or distance relays should not be used on six-wire circuits without careful investigation of the possible error in measurement or operating time for phase faults involving only two or three conductors. Such errors may result in loss of selectivity or possible instability due to slow clearing and should be corrected by jumpering similar phases at one or more points on the circuit.

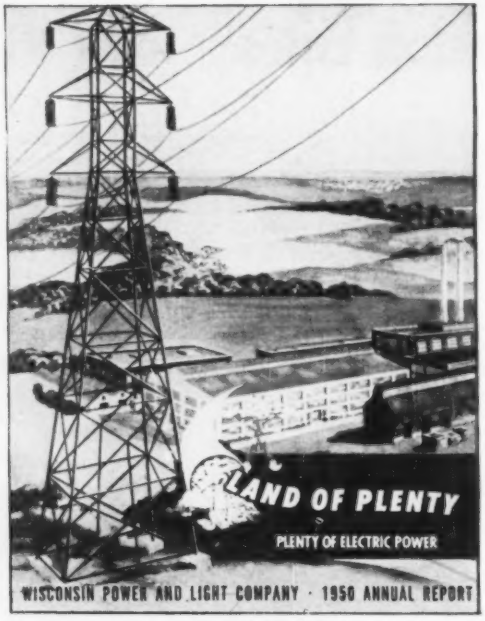
Two or three sets of jumpers are usually sufficient. The critical condition is that the curves of apparent ohms as at K, Fig 3, should be well below the line MN, otherwise a fault at this location may require Zone 2 clearing from both ends of the line.

The location of jumpers should be determined by drawing curves of apparent impedance as measured by the relays on each end of the line, taking into consideration:

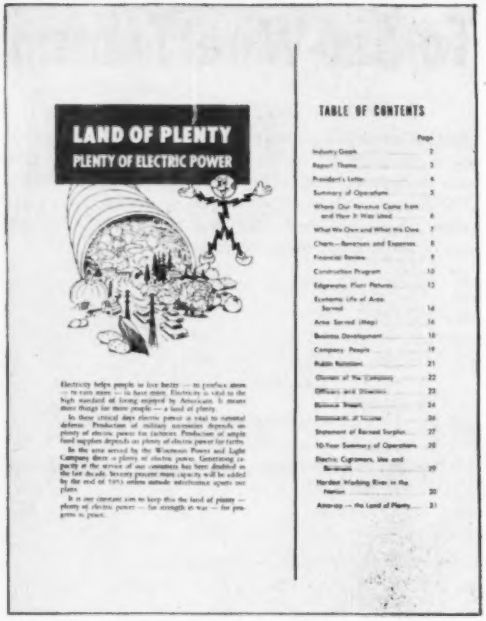
1. Effect of maximum and minimum generating conditions at each end of the line.

2. Change in apparent ohms after the far end breaker opens.

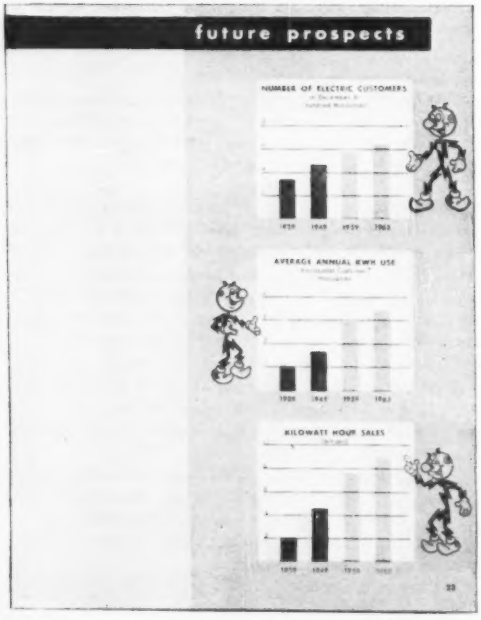
3. Possible need for added time delay on back up relays to allow for the opening of the far end circuit breaker.



Cover Wisconsin Power & Light Co—Winner in 1951 . . . Chose "The Land of Plenty" as report theme



Contents Page Wisconsin Power & Light Co—1950 . . . Table of contents explained report theme



Forecast Union Electric Co of Missouri—1949 . . . Bar charts on customers, kwhr sales, and home use

What Contest

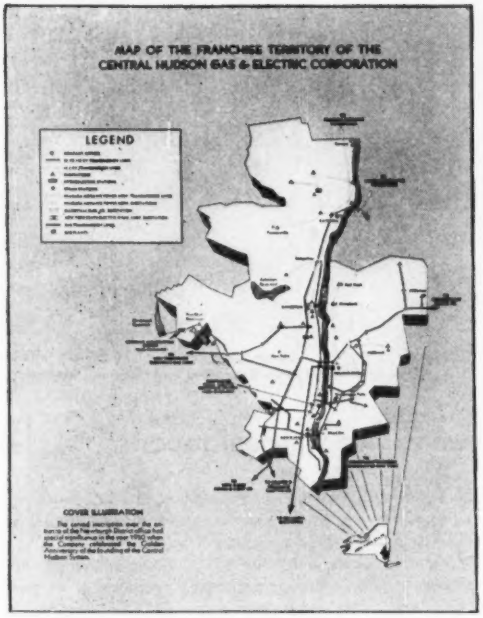
Twenty Tips on How to Dramatize, Humanize, and Simplify your Future Annual Reports

Here are some tips on preparing annual reports. They were revealed by the judges of the last Reddy Kilowatt Annual Report Contest. These men have had many years' experience in preparing, publishing, and studying annual reports not only of utility companies but of other industrial enterprises as well. Now for the first time, since the contest started in 1939, these suggestions have been released for publication.

The only requirement for this contest, which is open to any investor-owned electric company, is that annual reports must effectively dramatize, humanize, and simplify the story of the company operations in a way that every reader will understand. To achieve this goal, the judges offer these tips when preparing your 1951 annual report.

Appearance

Cover . . . Should be simple and should tie in with a theme, if possible, around which the report is written. Use illustration typical of territory served. Color is preferred, but not essential.



Map Central Hudson Gas & Electric Corp—1950 . . . This concise and illustrated map showed franchise area

Prime Interest Portland General Electric Co—1950 . . . Good illustrated opening paragraph

Judges Seek in Annual Reports

Typography . . . Type should be large enough to be easily read. Subheads should break up solid blocks of type.

Layout . . . Should be lively, have variety from page to page; include simple statistical tables, charts, and graphs; use dramatic pictures with human interest; and descriptive captions.

Table of Contents . . . Concise and simple. If a theme is used, it can be explained on this page.

Map of Territory . . . A clear and well drawn map is recommended. Don't try to show too much. Simplicity is essential.

Center Spread . . . Dramatize, humanize, and simplify. Use fairly large pictures. Little copy is necessary. But tie in to main theme, if possible.

Chart Presentation . . . Simplified charts and drawings are useful to hold reader interest and emphasize important points. Complicated charts are confusing to the layman.

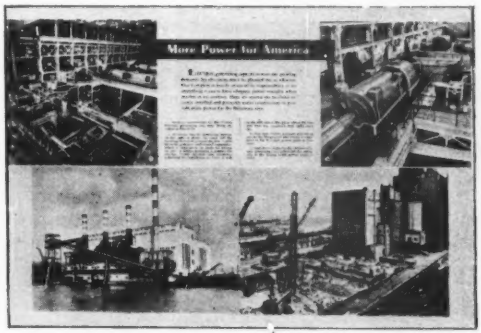
Analysis of Year . . . Highlights of past year in bold type on left side of page with "The Year in Review" beginning on the right hand page makes an attractive presentation. It speeds up reading.

Human Interest Pictures . . . Be sure to show employees doing special work as repairing damage caused by snow, sleet, rain, wind; connecting new rural customers; or the building of power plants.

Contents

Text . . . Clarity is vital. Make sentences short and understandable. Avoid excess wordage. Where possible, define and explain technical and financial terms. Report all financial information in simplified form.

Forecast of Future Business . . . Describe the territory



Center Spread Consolidated Gas of Baltimore—1950 . . . "More Power for America" theme

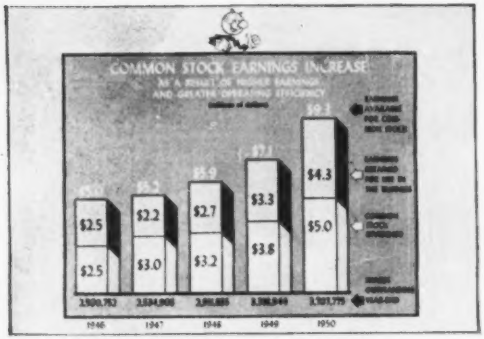
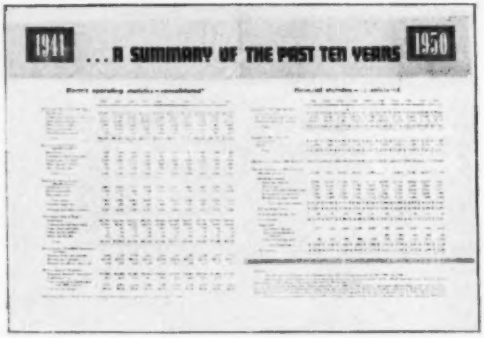


Chart Pennsylvania Power & Light Co—1950 . . . Chartered earnings available for common stockholders



Ten Year Table Union Electric Co of Missouri—1950 . . . Operating and financial statistics

Judges tell the secrets of preparing good annual reports

and its prospective growth. Discuss sales, customers, and electric plant. Company's efforts to build the territory will also be interesting to stockholders.

Ten Year Table . . . Show earnings in thousands of dollars, along with earnings per common share, number of outstanding common shares, dividends paid per share, times bond interest earned, and other financial statistics. Include as many electrical statistics as possible. Put last year in first column.

Opening of Prime Interest to the Reader . . . Get away from the old practice of opening paragraphs in the presentation of the report from the president with words like: "By order of the Board of Directors I have the honor to present, etc."

Officers' Names in Back of Report . . . Pictures of directors, officers, etc, should be kept to a minimum and be placed in the back of the report.

Conciseness . . . Make words count. Use a good snappy layout with sub-heads, short sentences, and large type.

Current Problems . . . Frank discussion of the company's and industry's problems including labor, finance, material, and governmental encroachment, and emergencies, such as the national defense program.

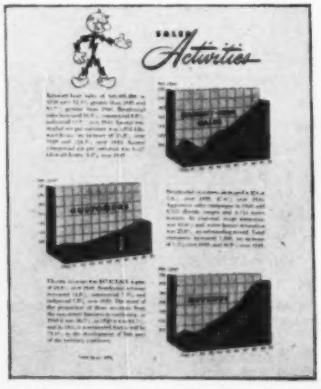
Company Goals and Policies . . . Clear statement of company credo, operating principles, relationship to the community, social and economic responsibilities.

Simple Statistical Tables and Charts . . . Less space should be used for auditors' certificate in back of report (frequently a whole page has been given to such certificates). For the stockholder, put simple charts and tables in body of report. For security analysts and record purposes, use detailed statistics in back of report. Comparative financial statements showing figures in columns by years—the first column on the left should be headed by the current year for which the report is made.

Discussion of Special Company Services Rendered . . . Company activities to benefit customers, such as scholarships for local youths, help to civic groups, etc.

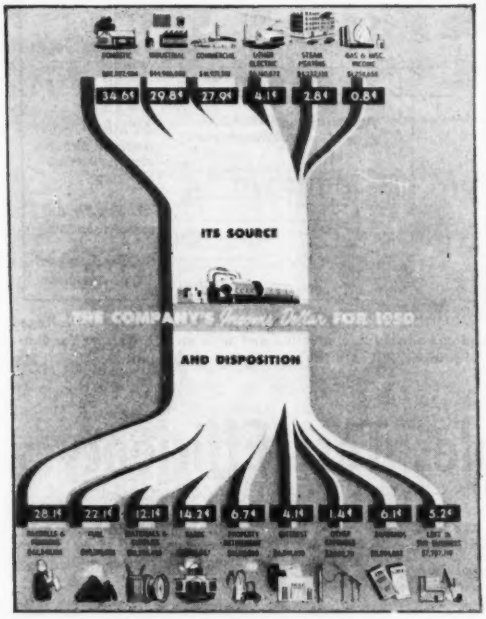
Judges point out that annual reports should appeal to employees as well as stockholders.

HUMAN INTEREST—Long Island Lighting—1950 . . . Employees in storm



CONCISENESS—Atlantic City Electric—1950 . . . Showed charts with text

CURRENT PROBLEM—Illinois Power 1950 . . . Electricity in national defense



Analysis of Year **Detroit Edison Co—1950 . . . Chart depicted income-outgo of earnings**

Officials **Kansas Power & Light Co—1950 . . . Small pictures of directors with biographical sketches**

Wisconsin Power & Light Co, in winning the 1950 Reddy Kilowatt Annual Report Award, followed this outline to a substantial degree. This is borne out by the judges' statement on its entry:

"Its report for the calendar year 1950 had all of the elements which the rules of the contest required, plus a statement of the philosophy and goals of the company and the industry.

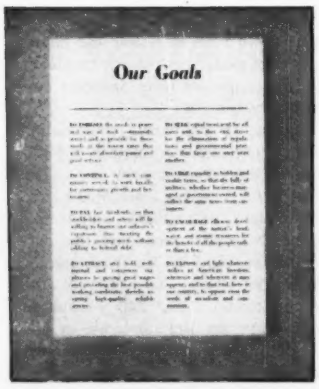
"It carried a theme, 'The Land of Plenty,' throughout the report, which tied the company's functions into that of territorial development.

"On pages 6 and 7 it gave long-term comparisons of simplified statistics, with a good balance between charts and pictures. On page 7 it simplified the balance sheet.

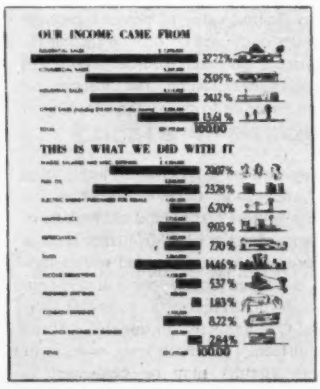
"Pictorial presentation of the company's operations was extremely good, as was the use of illustrations relative to the business.

"The picture on page 22 was a photograph of actual, bona fide stockholders instead of a conventional picture of a lot of people as stockholders.

"The cover of the report was very colorful and yet quite relevant to the report."

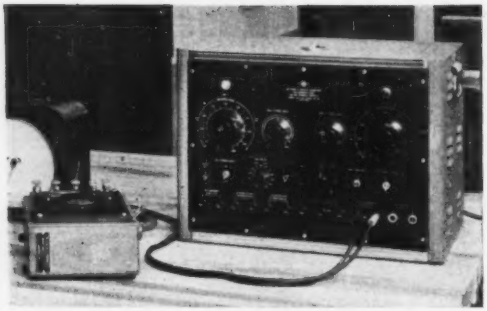


GOAL—Iowa Power & Light—1950 . . . Showed eight point goal in concise form

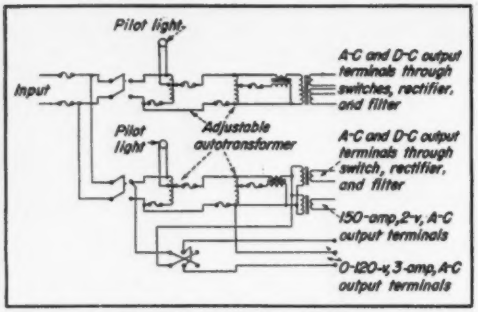


SIMPLE TABLE—Florida Power Corp—1950 . . . Table of income-expenses

SPECIAL SERVICES—Arkansas P&L—1948 . . . "Build Your Home Town"



DOUBLED EFFICIENCY plus better housekeeping and greater safety for personnel and equipment result from use of this power supply for instrument testing


Pilot light
Input
A-C and D-C output terminals through switches, rectifier, and filter
Pilot light
Adjustable autotransformer
A-C and D-C output terminals through switch, rectifier, and filter
150-amp, 2-v, A-C output terminals
0-120-v, 3-amp, A-C output terminals

TWO INDEPENDENT CIRCUITS with a wide range of voltage and current, fully controlled and with an 8% vernier for fine adjustment, indicate the possibilities of this unit

Power Supply Doubles Test Efficiency

W. A. ERSKINE
Laboratory Supervisor
Southern California Edison Co
Los Angeles

Use of a commercial power supply unit slightly modified to their specifications has enabled Southern California Edison to cut time required for instrument testing by more than half. Better housekeeping, greater safety for personnel and equipment, and more consistent results are other benefits.

Time is saved not only by eliminating the need for collecting, connecting, and checking the many components required to set up an instrument test, but also in the actual testing itself. Controls permit the operator to move quickly from one test to another, and go back to previous tests with a minimum waste of time.

Construction . . . The power supply unit has two independent and electrically-isolated circuits, and operates on 120 v ac. Each circuit has continuously-variable full-range control with a separate 8% vernier control. The first circuit provides both ac and dc potentials in six convenient ranges up to 0–750 v, and alternating current up to 10 amp at 8 v. The second circuit is primarily a current source providing ac and dc ranges of 0-10 amp and an ac source of 0–150 amp. It also provides both a variable and a fixed 120-v ac source of 3-amp capacity. This 120-v ac circuit is especially arranged to permit checking 3-phase power factor indicators from a single phase source.

Variable and fixed sources have one leg in common and are brought out to three terminals on the panel. A switch is arranged to interchange the fixed and variable sources between the two sets of terminals. In testing a 3-phase power factor indicator its potential circuits are connected in parallel with those of a standard to these three output terminals. The current coils are connected in series and energized at approximately rated current from the first circuit.

With the second circuit vernier control set at zero the indicators can show any desired value of power factor between unity and 0.50 by adjusting the variable potential source. With the interchange switch the instruments can be made to show either leading or lagging power factors.

Applications . . . Widest application of the power units is in connection with routine testing and calibration of common types of instruments such as ammeters, voltmeters, and wattmeters. It has been found particularly convenient and efficient to gang-test thermal type ammeters in quantities of ten to fifteen. For such tests, sources of both circuits may be connected in series where the combined impedances of several instrument current coils require more voltage than is available from either circuit individually.

Practically any desired range of ac or dc potential is available from the first circuit for checking voltmeters. Wattmeters are normally tested by using the first circuit for potential and the 10-amp terminals of the second circuit for current. Larger capacity wattmeters can be checked by utilizing the 150-amp output of the unit.

Ac and dc milliammeters may be supplied from the potential terminals of the first circuit, using an external resistor to limit the current. A megohm resistor built into a special plug is used as a limiting resistor for microammeters and highly sensitive millivoltmeters. The 150-amp current source is used in conjunction with wind-down coils in testing the higher ranges of maximum reading ammeters and other devices using splitcore current transformers.

Testing control panels for induction voltage regulators is another application of the power supply unit. The first circuit is used as a potential source to simulate the regulator output secondary voltage. Secondary line current is supplied to the compensator from the 10-amp terminals of the second circuit. The 240 v required to operate the holding coils of the contact-making voltmeter is supplied through an external 120/240-v transformer from the fixed 120-v output of the second circuit.

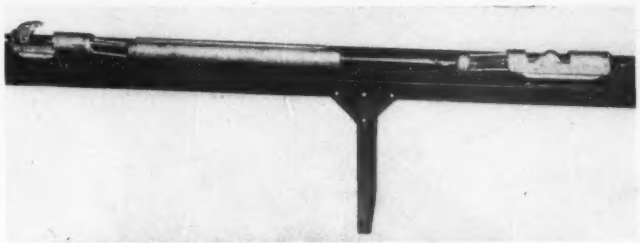
HOW TO DESIGN • CONSTRUCT OPERATE • MAINTAIN

Mechanical "Mole" Rods Conduit

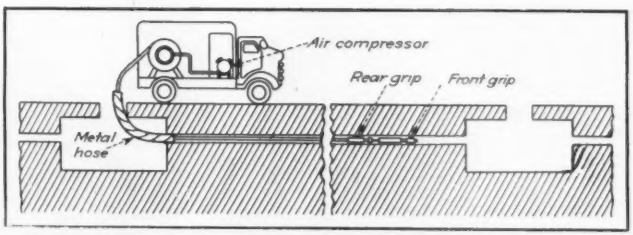
C. JASPER
Engineer, Underground Division
Construction Department
Commonwealth Edison Co
Chicago, Ill.

Mechanical rodding of conduit has been made more positive by application of a small compressed air reciprocating engine equipped with air-operated duct grips which propels itself through the duct, pulling the air supply hose behind it. In operation the rear grip lifts and binds against the duct while the machine pushes forward. The front grip lifts and binds against the duct while the rear grip section is pulled forward for another "bite." When the machine reaches the end of the duct, it is disconnected and the "pull wire" is connected to the end of the hose and drawn into the duct as the hose is removed.

This method has the advantage over the method of blowing a rubber cup, followed by a small wire, through the duct because it does not require air-tight, or even reasonably air-tight ducts. The compressed air hose is carried right along with the machine so that there is no loss of air pressure with air leaks in the conduit. With the pre-cast concrete ducts used in Chicago, air leaks in the conduit are not uncommon. The new compressed air machine will also go through ducts that are partly filled with mud or sand.

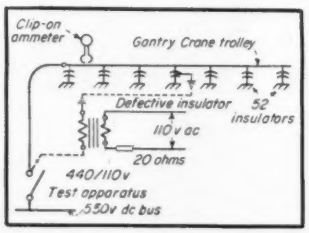


MECHANICAL MOLE consists of compressed air machine which crawls through conduit in this manner: Grip at left lifts and binds in duct while machine pushes forward; grip at right opens to holding position and rear grip lowers and is pulled forward for another "bite." Crawler moves through conduit rapidly



FIELD OPERATION begins as duct crawler is placed in conduit with air hose attached. Hose unreels as crawler moves forward. When crawler reaches end of duct it is removed. Pull wire is attached to air hose, which is then pulled back through duct. Metal hose in manhole at right is used to protect air hose

A crew of six men, including the foreman and truck operator, can accomplish 75% more work with the new compressed air machine than a crew of nine men using the old hand rodding method.



GROUNDED INSULATOR is located by using ac test apparatus connected to dc crane trolley circuit. Dashed line indicates path of fault current

Locate Grounds on 550-v Circuit

B. R. SMITH
Electrical Maintenance
Indiana & Michigan Electric Co
Mishawaka, Indiana

A time and effort saving method of locating grounds on a 550-v dc station circuit has been used at Twin Branch generating station. Faulty insulators and faulty lightning arresters are located readily.

Here 104 insulators support the dc trolley wires feeding the coal handling gantry crane. To locate a faulty insulator, two man-days were sometimes required, with concurrent service outage. While the usual indicating device shows which conductor becomes grounded, location of the faulty unit was impeded because insulators are mounted in semi-accessible locations on the side of the trestle. Each unit

(*Continued on page* 78)

HERE'S THE NEW G-E 32-STEP REGULATOR

You get single-phase ML32 for same price as 8-step unit. And look at these features!

- **±10% regulation.** 20% range of regulation in thirty-two 5/8% steps.
- **Complete range of ratings** in the 2500-volt class (50 to 150 amps), the 5000-volt class (50 to 100 amps) and the 7620-volt class (25 to 100 amps).
- **New improved switching mechanism** has controlled tap-changing speed that gives maximum contact life.
- **Class I control accuracy**—the highest accuracy classification defined by industry standards.
- **New position indicator** is large magnetic-type, slanted downward for easy reading from ground.

For more information on today's best regulator buy get in touch with your local General Electric Apparatus sales office. Or write General Electric Co., Sect., 404-89, Schenectady 5, N.Y.

GENERAL ELECTRIC

Locate Grounds

(*Continued from page 75*)

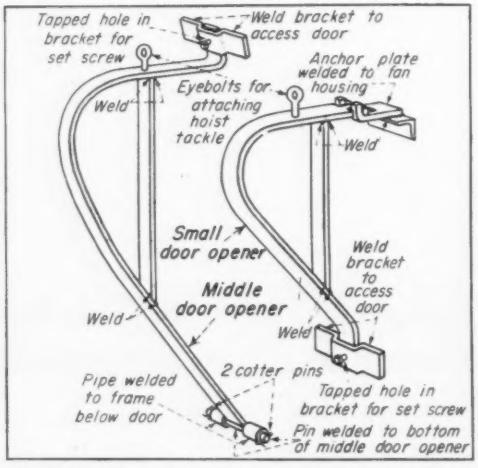
had to be disconnected successively.

The simple method of locating such grounds follows. Normal power supply is disconnected from the trolley wires, and 440-v ac power is applied between the feeder and ground for testing, as illustrated. (In some cases 110 v are not sufficient to start current through an insulator that has failed on 550 v). After breakdown on the initial test voltage, the resistance becomes quite low, permitting a 2-amp exploring current to flow into the trolley feeder as indicated.

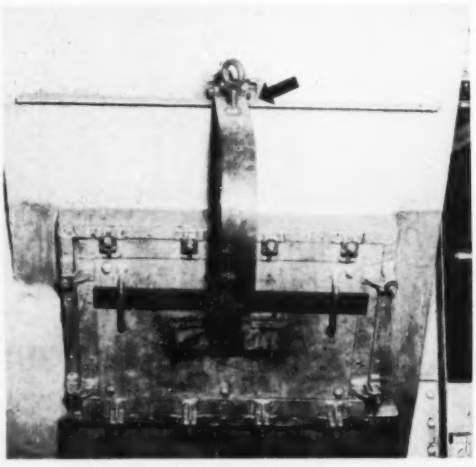
A clip-on ammeter is applied to the trolley wire at the first insulator and successively moved past each insulator until the reading drops abruptly to zero, indicating that the last insulator is faulty. These tests are easily made by leaning over the side of the trestle.

A similar method is used for locating faulty lightning arresters connected at 13 points on the Twin Branch railroad trolley wire between the latter and the grounded track. Electric storms sometimes cause these arresters to fail, thereby grounding the trolley wire. Since these arresters are mounted on poles, it was previously necessary to climb a pole to disconnect, test, and reconnect arresters.

Now location of a faulty unit is found simply by connecting a 110-ac supply through a 20-ohm resistor or 550-w lamp to the trolley wire, and applying a clip-on ammeter to the ground wire from each arrester in succession until test current is found.


Tapped hole in bracket for set screw
Weld bracket to access door
Anchor plate welded to fan housing
Eyebolts for attaching hoist tackle
Weld
Weld
Small door opener
Weld bracket to access door
Middle door opener
Weld
Weld
2 cotter pins
Pipe welded to frame below door
Tapped hole in bracket for set screw
Pin welded to bottom of middle door opener

DOOR OPENERS attached to access doors on induced draft fan housings keeps doors from tilting askew while being closed



SMALL DOOR OPENER hinges at top (arrow) because of actuators located below. Eye-bolt permits hooking of block

Open Fan-Access Doors Safely and Easily

ALBERT P. KEMPLE
Master Maintenanceman
Tidd Generating Division
Ohio Power Co
Brilliant, Ohio

Two types of door openers have simplified a problem of removing access doors to induced draft fan housings. Now the job can be done with three men and only two if necessary.

Due to the inclined side of the fan housings and weights of the access doors, removal of the doors was formerly a job that required five men. With so many men handling a heavy object there is always the possibility of some one being injured if the object slips or one man stumbles.

For removal of a center door with which the openers are used, a set of rope tackle blocks is attached to the eye-bolt at the top of the opener which supports the weight of the door while it is being removed. Then the door-locking nuts are removed allowing the opener to swing the door gradually to the floor. For this procedure two men are needed on the block and one to remove the lock nuts. To replace the door, it is simply lifted with the tackle while the opener swings it through an arc into the opening where it is locked.

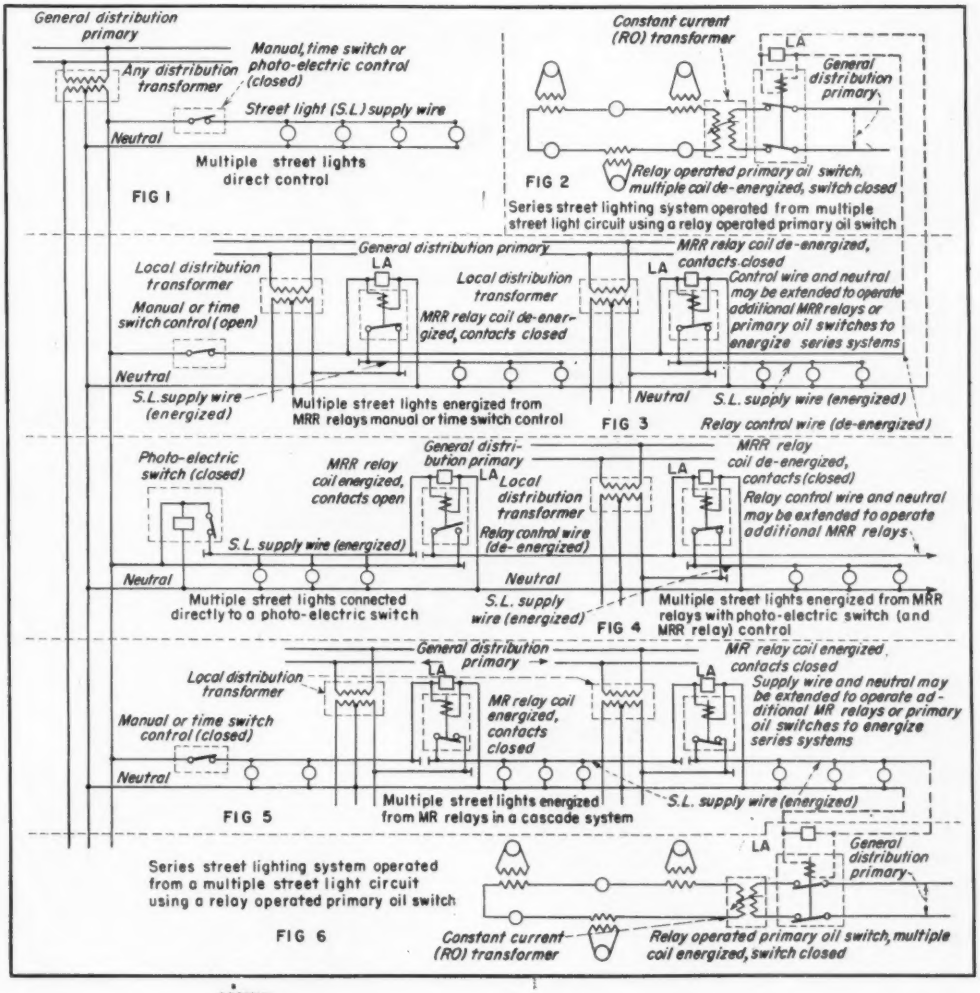
The small suction side doors presented a different problem because of the actuators beneath them. For this reason an opener hinge was provided above instead of below the doors. In this case it is necessary only to unbolt the door, allow it to swing open by its own weight, and then lift the door off the hinge anchor with the tackle and lower it to the floor. To replace the door, the opener is set on its hinge anchor and the door swung back into place. One man can do this while another secures the doors.

Once the door has been removed, care must be taken not to twist the lock-bolt ears otherwise the door will not swing back freely into its opening. An opener is provided for each of the side doors so both can be removed at the same time.

For added safety while opening the small side doors, a bar is threaded through the door handles and door opener, as illustrated, to guard against the possibility of a loose set screw on the holder.

Street Lighting—Multiple Systems

Methods of energizing, control and operation in conjunction with series systems. All equipment shown in night-time operating position with all lamps energized. An adaptation from construction standards of Consumers Power Co


General distribution primary
Any distribution transformer
Manual, time switch or photo-electric control (closed)
Street light (S.L.) supply wire
Neutral
Multiple street lights direct control
FIG 1
Constant current (RO) transformer
LA
General distribution primary
Relay operated primary oil switch, multiple coil de-energized, switch closed
FIG 2
Series street lighting system operated from multiple street light circuit using a relay operated primary oil switch
General distribution primary
Local distribution transformer
LA
Manual or time switch control (open)
MRR relay coil de-energized, contacts closed
Control wire and neutral may be extended to operate additional MRR relays or primary oil switches to energize series systems
Neutral
S.L. supply wire (energized)
Multiple street lights energized from MRR relays manual or time switch control
FIG 3
Relay control wire (de-energized)
Photo-electric switch (closed)
MRR relay coil energized, contacts open
General distribution primary
Local distribution transformer
Relay control wire (de-energized)
MRR relay coil de-energized, contacts (closed)
Relay control wire and neutral may be extended to operate additional MRR relays
S.L. supply wire (energized)
Multiple street lights connected directly to a photo-electric switch
Multiple street lights energized from MRR relays with photo-electric switch (and MRR relay) control
FIG 4
General distribution primary
Local distribution transformer
Manual or time switch control (closed)
MR relay coil energized, contacts closed
MR relay coil energized contacts closed
Supply wire and neutral may be extended to operate additional MR relays or primary oil switches to energize series systems
Multiple street lights energized from MR relays in a cascade system
FIG 5
Series street lighting system operated from a multiple street light circuit using a relay operated primary oil switch
FIG 6
Constant current (RO) transformer
Relay operated primary oil switch, multiple coil energized, switch closed

LEGEND

L.A.	Lightning Arrestor		
Relay, SR	Series relay whose contacts are open when the series coil is de-energized.	**Relay, MR**	Multiple relay whose contacts are open when the coil is de-energized.
Relay, SRR	Series relay whose contacts are closed when the series coil is de-energized.	**Relay, MRR**	Multiple relay whose contacts are closed when the coil is de-energized.

SPIRAKORE® TRANSFORMERS

GIVE EXTRA YEARS OF SERVICE

Soaked in the flood...

"We cleaned and tested the first few of the newer transformers," said city engineer, Harvey Earp, "and found that no water had gotten in, . . .

"so we just hosed down the remaining Nitrile-sealed transformers, gave them a routine check, and put them back on the lines."

G-E Spirakore* Transformers stay moisture proof!

When the flood hit the city of Osawatomie, Kansas, it completely submerged a number of distribution transformers. Yet service was restored in most areas only a few hours after the water receded.

This speed was possible because of the fine work done by the repair crews . . . *and the water-tight seal on G-E Spirakore transformers.* Although water did leak into some transformers of older design, every one of the Nitrile-sealed Spirakore transformers came through unharmed. The first Nitrile-sealed transformers recovered were cleaned and found undamaged—so the rest were merely washed with a hose, given a routine inspection, and put back in service without an inside tank check. And they are still on the job!

Nitrile Gaskets Used in Every Opening! Not even flood waters could get into Spirakore transformers because every opening—for cover, hand-hole and bushings—gets sealed with a Nitrile gasket. Completely air-tight, water-tight, this sealing eliminates transformer breathing—prolongs the life of both oil and insulation. Because no cement or sticker is used, gaskets can be removed easily—are reusable.

Better sealing is just one of the design features that make Spirakore the finest transformer obtainable. Bulletin GEA-5400 describes many more. If you haven't a copy, write for one today. Address *General Electric Co., Schenectady 5, N.Y.*

*Reg. Trade-mark of General Electric Co.

"The Nitrile seal," continued the city engineer, "kept our Spirakore transformers air-tight and helped us get our system back in service just a few hours later."

402-117

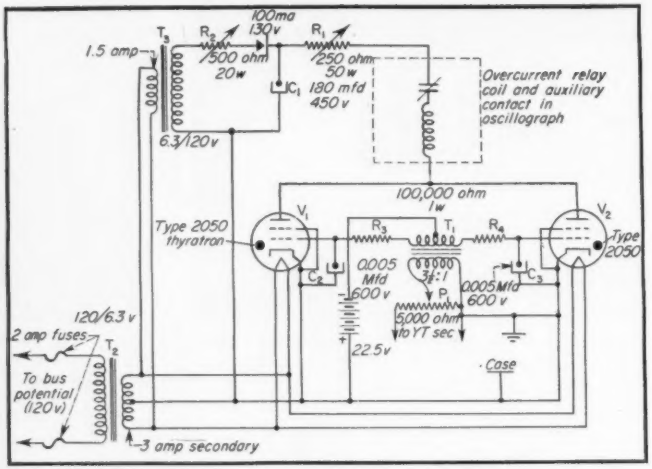
GENERAL ELECTRIC

Support Service Drops with Preformed Lashings

PREFORMED LASHING WIRES present neat and easy installation when attaching street light services to messengers supporting fixtures. Wires come in 5-ft lengths for specific application. Conductors are secured to messenger at mid-span and at pole end with tape

Meter Rack on Wheels Simplifies handling

METER HANDLING and storing have been simplified by use of a specially built meter-rack-on-wheels. An A-frame made with three standard mesh panels is mounted on large casters. S-hooks made of common nails provide simple means for mounting meters. One man can move frame easily to any location in the shop or meter storage area



TRIGGER CIRCUIT sets off an oscillograph to record conditions on a 132-kv line during a disturbance. Heart of the circuit is type TY relay transformer

Circuit Triggers Record of Disturbance

KARL R. WIEGAND

Division Meter Superintendent
Indiana & Michigan Electric Co
South Bend, Ind.

At Twin Branch generating station an oscillograph is connected to automatically record conditions on any 132-kv line which may be subjected to abnormal conditions. The thyratron trigger circuit illustrated, which was designed and constructed by the author, has given satisfactory service for approximately 2 years.

The simplest method of starting the record can be applied when the oscillograph is at a station having wye-grounded transformer banks. These banks have a neutral current transformer to actuate the overcurrent starting relay which is furnished with the oscillograph. However, when a neutral current transformer is not available, other methods must be used.

Operation is based on the action of the type YT transformer, commonly used for relaying purposes. This transformer consists of three single-phase transformers with primaries connected wye and secondaries connected in delta with one corner open. When its primary circuit is energized from balanced 3-phase line potentials, the vector sum of the secondary voltages delivered at the open delta terminals is zero. However, when line potentials are unbalanced due to neutral fault current somewhere on the system, the resulting secondary voltages no longer total zero and an appreciable voltage occurs at the secondary terminals. This voltage reduces the negative bias and fires the thyratrons, which are joined for push-pull operation. The resulting plate current trips the overcurrent relay on the oscillograph so that the latter will be triggered into recording on the first half-cycle of fault current.

To restore the thyratrons automatically to their unfired state, the normally open right-hand contact of the auxiliary relay directly above the overcurrent starting relay was converted to a normally closed contact and connected in series with the overcurrent relay coil. This contact removes plate voltage from the thyratrons approximately 0.01 sec after the over-current relay trips. The oscillograph then completes its recording cycle.

Auxiliary relay on the oscillograph need not be modified if an external auxiliary relay with a normally closed contact is added to the circuit to remove plate current from the thyratrons. The operating coil of this added relay should be energized by the alarm contact on the oscillograph. It would then perform in same manner as the modified relay mentioned.

(*Continued on page* 86)

GENERAL ELECTRIC COMPANY

TRANSFORMER AND ALLIED PRODUCTS DEPARTMENT

100 WOODLAWN AVENUE, PITTSFIELD, MASS . . . . . TELEPHONE 8211

December 3, 1951

SUBJECT: New ASA Recommended Standards for Transformers

MEMORANDUM: To all G-E Transformer Specialists and readers of Electrical World

The transformer standards recommended by the American Standards Association (C-57 Sub-committee, lst report - 6th draft) do not materially affect the policies of this department.

We achieved the first effective standardization of power transformers in 1944 when we introduced our Repetitive-Manufacture line. The new recommended standards are, in a sense, a realization of these early efforts.

The kva ratings, voltage ratings and most accessories approved as standard by ASA have been available for some time as part of General Electric's "RM" line. Some minor modifications in base construction and location of accessories will be necessary for complete conformance with ASA Standards.

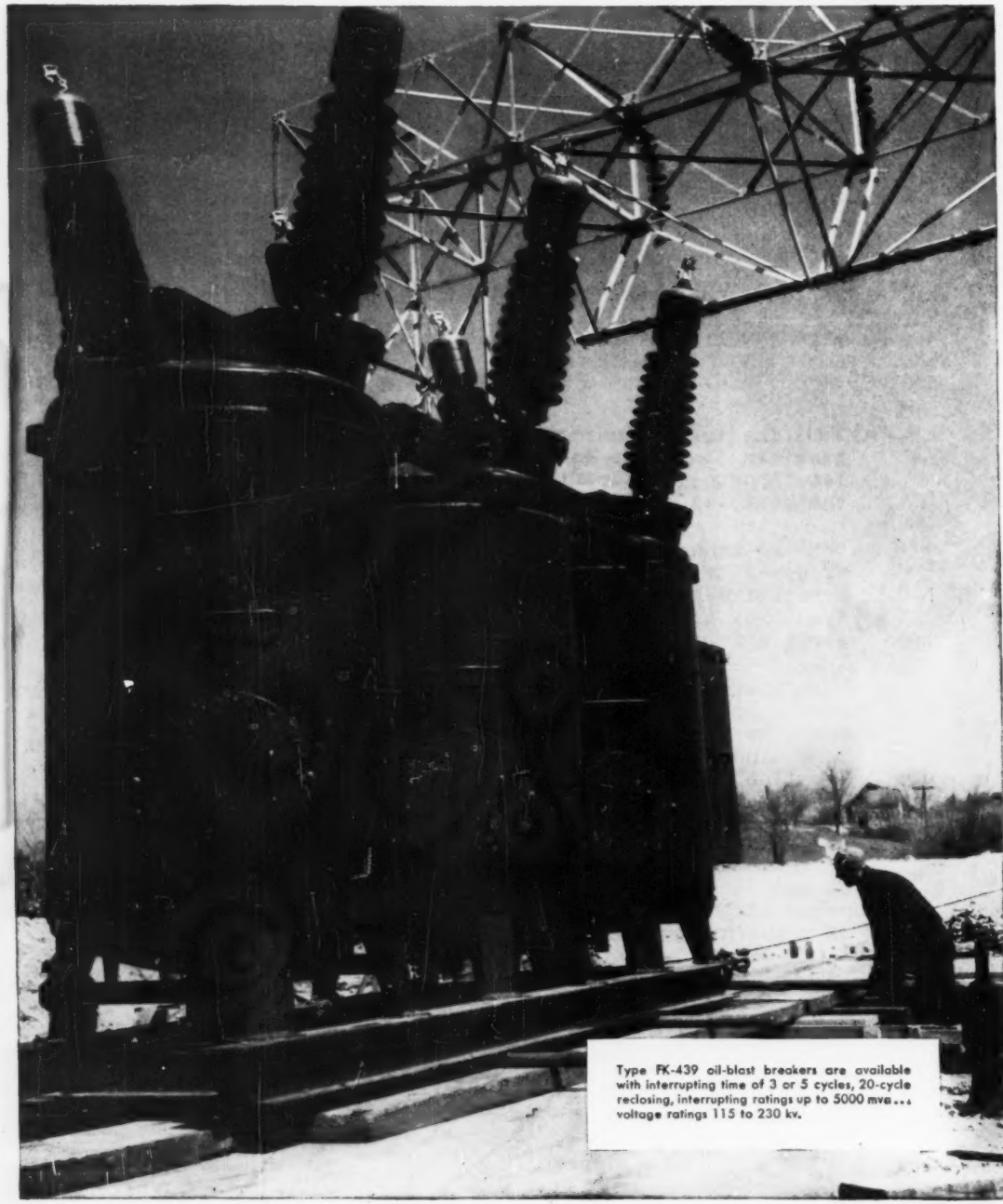
Customers desiring ASA standard transformers may order immediately. The necessary modifications will be made at the time of manufacture. Delivery and price advantages will be the same as those for present RM transformers.

W. S. Ginn

W. S. GINN
Manager of Sales
Transformer & Allied Products Dept.

401-27A

Central Hudson Gas and Electric



Type FK-439 oil-blast breakers are available with interrupting time of 3 or 5 cycles, 20-cycle reclosing, interrupting ratings up to 5000 mva... voltage ratings 115 to 230 kv.

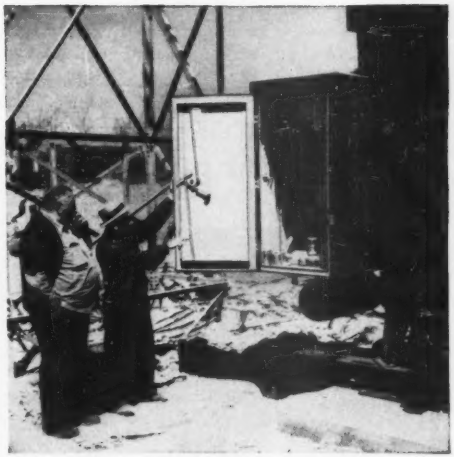
adds 33,000 kva of capacity

Type FK-439 oil-blast breakers protect new 110-kv system

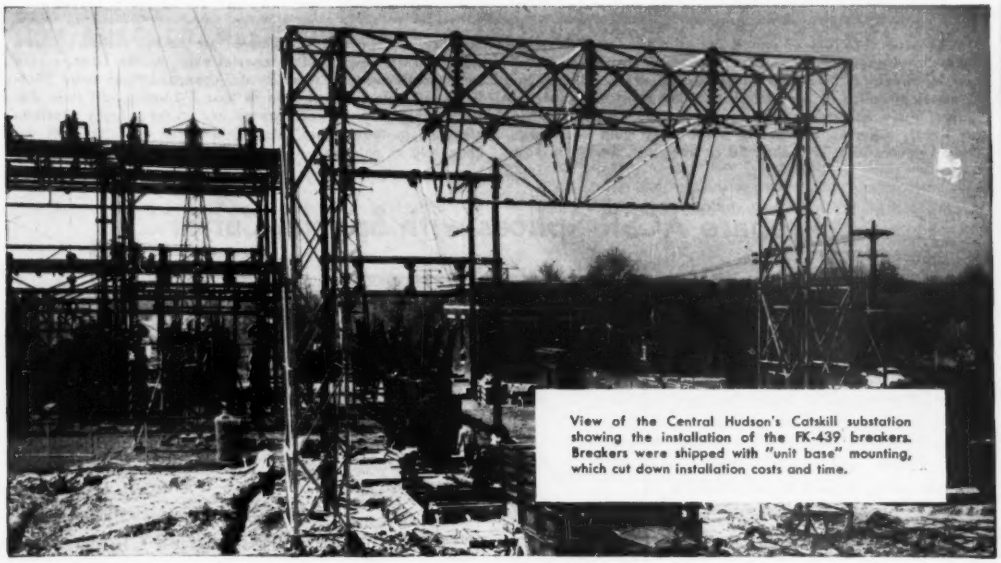
Recently Central Hudson Gas and Electric Corporation embarked on an expansion program to add 33,000 kva of capacity to its Catskill substation. Since plans called for changing high-line voltage from 66-kv to 110-kv, new circuit breaker equipment was necessary.

Company officials chose G-E Type FK-439 oil-blast breakers to protect the new installation. Multi-break interrupters and a dependable pneumatic operating mechanism provide high-speed performance and operating economy. Completely sealed bushings and accessibility of all internal parts simplify inspection and maintenance. Breakers were shipped with "unit base" mounting, which cut down installation time and expense.

Investigate these and the many other economic advantages to be realized when you use G-E switchgear on your system. Ask your G-E sales representative for further information on the FK-439 breaker, or write for Bulletin GEA-4407B, General Electric Company, Schenectady 5, N. Y.



Pneumatic operating mechanism is easily accessible. All working parts have an adequate margin of strength for safety and durability. Thoroughly tested and proved, built for dependable performance and operating economy.



View of the Central Hudson's Catskill substation showing the installation of the FK-439 breakers. Breakers were shipped with "unit base" mounting, which cut down installation costs and time.

GENERAL ELECTRIC

859-13

Circuit Triggers Record

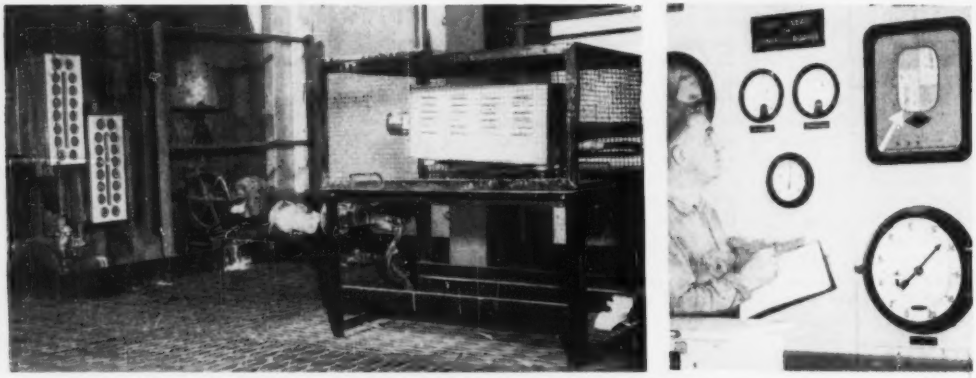
(*Continued from page 82*)

An auxiliary dc supply for the thyratrons is used because a number of false trips occurred when the station battery was used as an auxiliary supply. False trips were due to accidental grounds on the battery. It is recommended that the thyratron trigger and its dc supply be built as a single unit enclosed in a steel box.

Because the ac supply for the circuit is at bus potential, and any severe voltage dip might prevent operation of the trigger, an undervoltage starting relay is included in the oscillograph at Twin Branch. This relay is shown in the accompanying circuit diagram shown on page 82.

Attention is called to the fact that additional oscillographs at the same location can be tripped by one thyratron trigger by connecting the over-current relays of added oscillographs in series with the over-current relay on the original oscillograph. Two oscillographs were thus operated in tandem at Twin Branch Plant during the 1950 lightning season.

TV Brings Water Level to Control Room



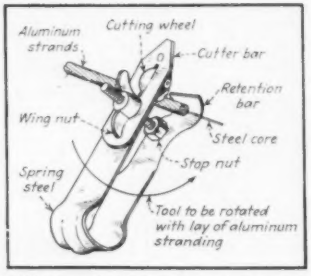
TELEVISION SYSTEM of closed circuit type is used to watch water level gages on both ends of drums of two 1,070,000 lb per hr boilers at Consolidated Edison Co of New York, Inc, Waterside station in Manhattan. TV image of either of four gages is viewed down at the operator's control panel (arrow at right). Cameras are set at least 6 ft from each gage. Signal generator is set about 50 ft from the camera, midway between the two gages. Cameras are on the station's fourth floor and are connected by coaxial cable to the 10-in. screen in the boiler control room on the operating floor some 90 ft below. Bi-color gage is used so that TV image will show distinct separation between water and steam. Light sensitive elements in the pick-up tube are affected by color, with red appearing as pale gray and green as a near-black

Prepare ACSR Splices with Special Cutter

CHARLES NICHOLSON
Distribution Dept
Ohio Power Co
Canton, Ohio

Development of a cutter has provided a more practical method for preparing ACSR conductor for splices. This device cuts back aluminum strands evenly without burrs, does not damage the steel core, and makes application of the splicing sleeve easier than formerly. Time studies have indicated considerable economy from use of this method.

The tool, developed by the author, employs a tube cutter. It has been equipped with a limiter to keep the cutter from damaging the steel core.



TOOL cuts back aluminum strands preparatory to splicing ACSR conductor. Stop nut limits cutting depth and prevents nicking of steel core

A stop nut serves as a stop for the cutter-bar and consequently the cutting wheel. The stop nut is set so the cutting wheel can just cut through the aluminum strands down to the steel core without nicking the latter. Aluminum strands are cut by rotating the cutter holder around the conductor in the direction of the lay of the aluminum stranding, while pressure is constantly applied through the wing nut.

Put Clamps on Hot Line With Stick Clamp Tool

Parallel groove clamps can be installed on a hot line by one man with a stick clamp tool developed by T. E. Dunman, Public Service Co of Oklahoma. The tool consists of a standard

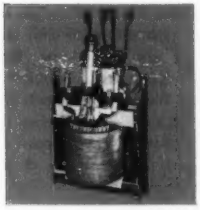
MOLONEY
HiperCore
CSP DISTRIBUTION TRANSFORMERS

DESIGNED TO MEET YOUR NEEDS BETTER . . . AND MORE ECONOMICALLY!

The Moloney HiperCore CSP Transformer with wound cores of cold-rolled silicon steel combines superior operating characteristics with low maintenance costs. Operating records show the better voltage regulation and greater short-time overload capacity of the HiperCore Transformer.

The CSP equipment contributes to the low maintenance costs on these transformers. Not only are they protected against lightning surges and short circuits, but also against overloads which tend to shorten the life of a transformer.

CSP equipment consists of the following: Lightning arresters, primary fuses, tank grounding gaps (on tanks not solidly grounded), and secondary circuit breaker with indicating light (to indicate overload).



Simplicity of design of the core-and-coil unit plus liberal use of materials and adequate cooling ducts make HiperCore Transformers cooler operating and better performing, resulting in longer life under normal operating conditions.

CHECK THESE FEATURES of all HIPERCORE TRANSFORMERS

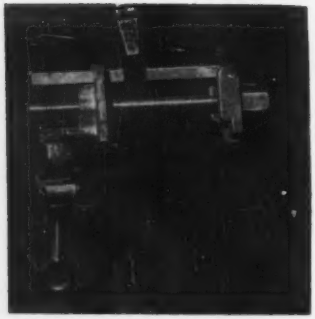
- ✓ **Excellent voltage regulation**
- ✓ **High short-time overload capacity**
- ✓ **Light weight**
- ✓ **Small size**
- ✓ **Long operating life**
- ✓ **Low temperature gradient**

MEBI-17

MOLONEY ELECTRIC COMPANY

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers • Step Voltage Regulators • Unit Substations

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA



STICK CLAMP TOOL makes installation of parallel groove connectors on hot line a simple job for one man

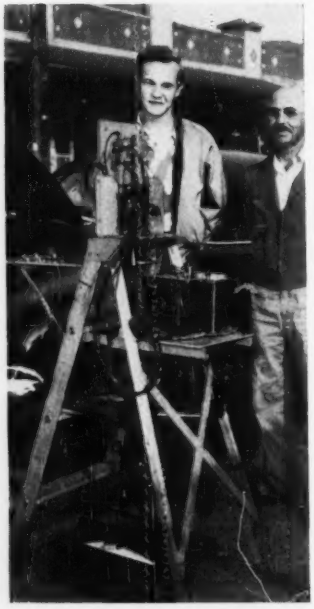
hot line clamp welded to one jaw of a vise.

In operation, the parallel groove clamp is placed in the vise and the tool and parallel groove clamp are slipped over the hot line by means of a hot stick. The hot line clamp is tightened temporarily on the line.

The tool holds the clamp in place on the line until the jumper wire is inserted and the clamp tightened with hot line tools. The stick clamp tool is then removed.

The tool has been developed for one-bolt and two-bolt clamps. Making a one-man job of this operation has proved a great saver of manpower.

Folding Step Ladder Speeds Meter Repairs

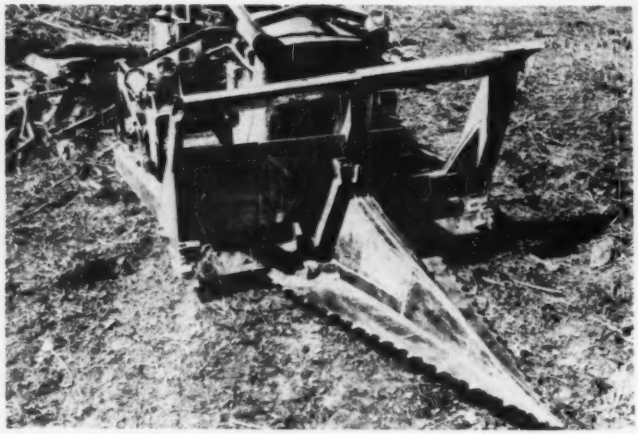


FOLDING TEST TABLE has speeded repair of meters on customers premises

Repairing and testing of demand meters has been made easier for two metermen of the Tacoma Dept of Public Utilities, Tacoma, Wash., by the use of a folding work-bench step ladder. This device is used by Bob Williams and Karl Kaiser who maintain demand meters for commercial and power customers of Tacoma City Light.

When the ladder is set up on location, phantom load and standard test meter are placed on the unfolded shelf; leads are connected to the test jack. Work table, which folds against ladder steps while being transported, is lifted into working position and held in place by folding shelf brackets. These brackets lock into the open position.

Demand register servicing tools can be laid on the table for easy access. Supply cable for the test jack is uncoiled and connected to the meter socket to obtain the proper test voltage. If more light is required, a show case lamp which is supported by a bracket over the work table may be turned on.



SIX-FOOT SAW BLADE attached to front of bulldozer cuts down trees with single pass. Machine cleared five acres of heavy timber per day at Boysen reservoir site

Clear Timber with Tractor-Mounted Saw

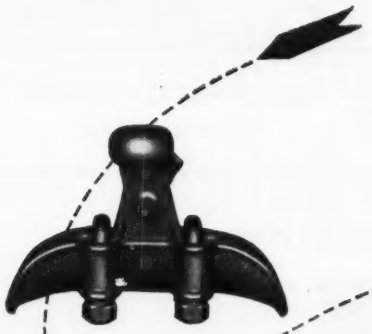
A bulldozer-mounted saw blade attachment cut by more than six months the time originally scheduled for felling trees in reservoir clearing operations at USBR's Boysen dam. It enabled a single dozer to do the work of five chain saws and crews.

The 6-ft long V-shaped saw blade is attached to the cutting edge of the bulldozer blade and cuts trees at ground level. The dozer operator guides the saw so that it strikes the tree near the point of the cutting edge and goes through the trunk in one pass. Trees with a circumference of up to 24-in. can be cut through by a single stroke.

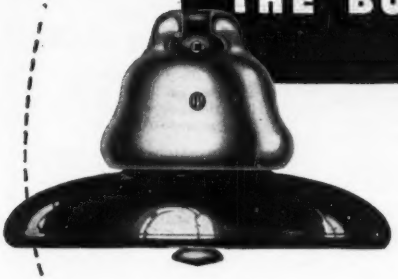
The seven contractors engaged in clearing the reservoir adapted several variations of the blade, using slightly different blades and teeth arrangements.

Some of the blades were finely cut and had to be kept sharp; others used a tearing action and did not require sharpening.

Approximately 12,722 acres at the Boysen reservoir area, located on the Bighorn River 20 miles south of Thermopolis, Wyoming, were cleared of trees, 3,610 of these acres being classified as heavily timbered. The blade made it possible to clear up to five acres of dense timber during an 8-hr day, and in more lightly wooded areas, 10 acres per day.



LET'S NOT PASS THE BUCK !



A fact you may not realize about O-B transmission line hardware is this -- it is the only material of its class designed, manufactured, sold, and backed by insulator specialists. In the insulator industry, O-B is the only one that owns and operates its own foundries and forge shops. We have free choice of materials and processes, all under our own roof and all equally available to produce the most serviceable product.

This is a whole lot more than being just "handy." It establishes an important point-of-view. It produces a single responsibility for the insulation *and* support of the conductor. These two closely associated jobs are likewise associated in the minds of engineers, designers, and manufacturing departments. It eliminates all "buck passing." Parts that must work together are made by men who work together.

Put the total responsibility for holding your conductors where it belongs -- in the hands of the only men who deal with the total problem. Build with O-B insulators *and* hardware.

Ohio Brass

MANSFIELD • OHIO

4131-H

SALES AND SERVICE

RESIDENTIAL • RURAL COMMERCIAL

Light Conditioning Builds Interest in Home Lighting

LIGHT CONDITIONING in low-priced homes makes use of portable valance and CLM lamps. In three-home demonstration sponsored by Rochester Gas & Electric, emphasis was placed on proper lighting in kitchen, bathroom, and for special seeing tasks

Light conditioned homes sponsored by Rochester Gas & Electric Corp have developed considerable interest on the part of the public in the proper use of light in the home. As a result of a showing of three light-conditioned homes this summer, additional contractors have asked for an opportunity to cooperate in the next showing; several decorators have requested information on light conditioning; and the drapery department of Rochester's largest department store is setting up a lighting display.

The Light Conditioning program really got its start in 1950 when the General Electric Co Lighting Clinic was presented in Rochester, and light conditioning was introduced and the CLM lamp program publicized. However, the need was felt to show what Light Conditioning means when it is planned for and installed as part of the construction of a new home.

Through the company's builders and architects bureau, cooperation was obtained from three contractors who agreed to work in building light-conditioned homes. The houses were in three price classes, which made it possible to show that light conditioning can be a part of any house, if it is planned for. The home lighting consultant in the home service department worked with the builder while the house was in the early stages of construction, and with the electricians who installed the actual wiring, to follow as closely as possible the recommendations in the GE Lighting Recipe book.

In the house, as many examples as possible were used of modern lighting and wiring devices, including plug-in-strip, switch controlled outlets, valance lighting, and other special lighting effects, with emphasis on proper lighting in the kitchen, bathroom, and for all special seeing tasks. Throughout the house, lighting was related directly to lighting recipes, so that visitors could check similar situations in their own homes. CLM lamps were used to complete the lighting story.

The homes were open for two-week periods and the total attendance of 6,886 was considered excellent. Home Service girls staffed the homes to explain the wiring and lighting, answer questions, and discuss individual lighting problems. Since that time, many who visited the homes looking for construction and decorating ideas have taken advantage of the company's free lighting and kitchen planning and wiring service so that their homes will be properly planned to take advantage of light conditioning developments.

U. V. Light Cuts Mortality of Chicks

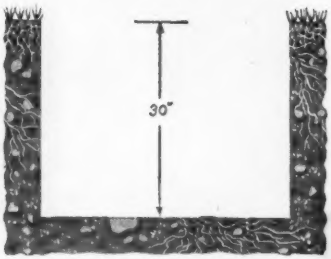
J. H. BODWELL
Director of Rural Service
New Hampshire Electric Co
Portsmouth, N. H.

Charles A. Hopkins, a large-scale poultry raiser at Rochester, N. H., was losing about 20% of his chicks during the brooding season six years ago. The mortality rate had been increasing yearly. Learning of ultraviolet rays he installed 30-w units in his two-story, 24 x 50 ft brooder house, putting in ten on each floor in rows 10 ft apart. He keeps from 2,000 to

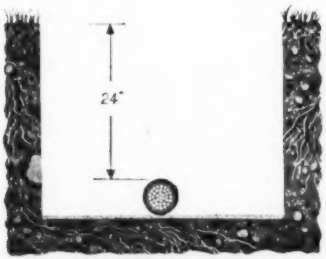
ULTRAVIOLET LAMP overhead keeps chicks healthy

How to install buried cables in trenches

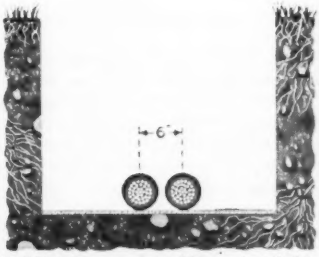
The most generally satisfactory way of installing buried cables is to lay them in a trench on a cushion of sand. There is less bending, distortion or tension than when a cable plow is used, a valuable factor if strains later occur through earth settling. The cable can also be protected by a treated plank or slab of concrete laid over it. Trenching permits the installation of cables at generally greater depths than does plowing. This greater depth makes cables less subject to damage by insects or rodents.



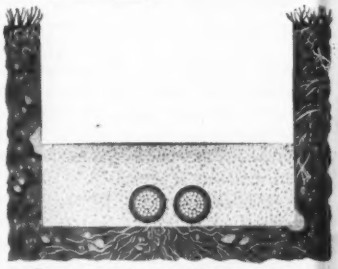
1. The trench should be deep enough (about 30") so that the cable, after providing the cushion mentioned below, will be at least 24" below the surface. This reduces the possibility of mechanical damage.



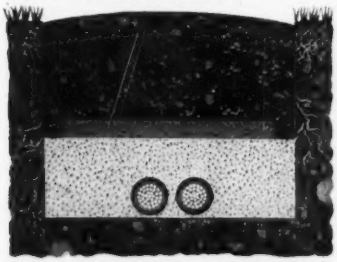
2. Put a cushion of sand on the bottom of the trench, or at least make sure the bottom is free of stones and other harmful debris. Lay cable with a slight snaking, to allow for earth settling and for expansion and contraction during load cycling.



3. When two or more cables are installed in the same trench, they should be spaced uniformly about 6" between centers so that the sand or earth can fill in around them. There must be no criss-crossing.



4. Cover the cable or cables to a depth of about 6" with sand or soft earth free from stones so that no rough edges will press against them.



5. Lay a concrete slab or creosote-treated plank on the sand or soft earth refill, to protect the cable and warn workmen of its presence. Complete the refill. Under highways, streets and rights-of-way, cables should always be installed in conduit.

Because of today's scarcity of rubber and copper, great care should be taken to see that your installations last as long as possible. With a few simple precautions, you can extend the life of your cables under normal operation. Although these precautions are well-known to many, we repeat them in the interest of getting maximum efficiency and long life out of our material and resources.

U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

Electrical Wire and Cable Department

ROCKEFELLER CENTER • NEW YORK 20, NEW YORK

Wi' a Hundred Ranges an' A' an' A'

Associated Press Newsphoto

ANNUAL BIG BOOST for electric cooking occurs for the third time in Grand National Bake-Off in New York's Waldorf-Astoria—culmination of Pillsbury Mills' cooking contest. Finalists, 100 women and boy and girl teenagers, cook on 100 electric ranges in competition for $138,000 in prizes

2,500 laying birds and sells at retail about 9,000 birds per year. U. V. light is on continuously for 8 weeks or as long as the chicks need to be kept in the brooder house, and 4,000 chicks are brooded at a time.

The first year of U. V. lighting service the mortality rate in this installation's brooding dropped to only 3%. The cost of operation is about 1 cent per chick. With the exception of one lot, the mortality rate in five years' operation has remained at a low 2 to 3%. It has been found necessary in recent years to inoculate the chicks against bronchitis, and when this is done, the U. V. lights are turned off for a day or two lest the inoculation be only spotted.

Service for Time Switches

A new exchange plan for users, dealers, and distributors of General Electric T-47, T-470, and the new T-471 time switches has been announced by the company's meter and instrument department. Under the new plan, users of the time switches can return an inoperative or damaged switch or mechanism to their dealer, distributor, the nearest G-E warehouse, or to one of three exchange points and immediately receive a new time switch in exchange. No charge for the new unit is made if the inoperative switch is returned within 18 months from the time of manufacture. If returned after the warranty period, a flat charge of $7.00 is required for exchange of the complete time switch, or $6.25 for the mechanism alone.

Promotion Carries On

Even though production of major electric appliances faces an uncertain future, NEMA promotion of them at the architect and builder, home economist, school management, plumber, and dealer levels will continue in the coming year. Advertising and promotion programs for 1952 were approved for their products by the Electric Range, Electric Water Heater, and Farm and Home Freezer Sections at the recent annual meeting of the Association.

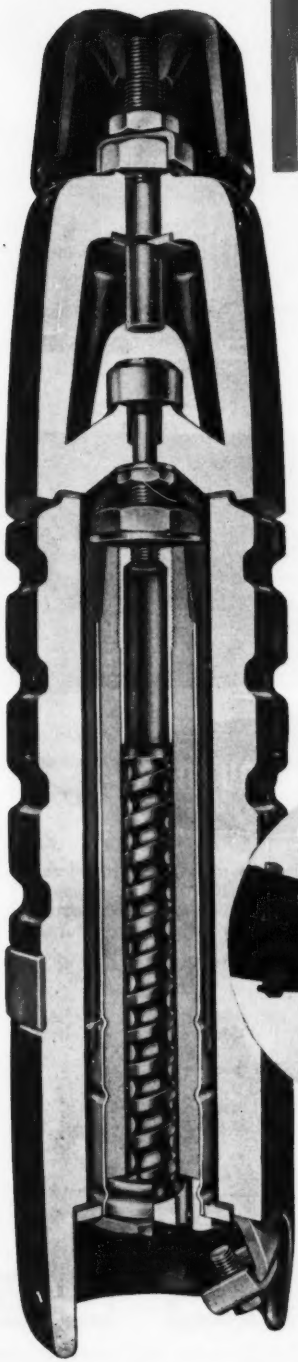
Quick Blanket Service

• Owners of inoperative General Electric blankets no longer have to wait for repairs. Instead, the blanket or the control, as the case may be, is immediately exchanged for a new unit by designated dealers and distributors. The plan covers all GE blankets made since 1945. Except for blankets still covered by warranty, which are exchanged without cost, the owner of a PB-11, -12, or -15 blanket pays $5.95 for a single and $8.95 for a dual control. Exchange prices for these blankets are $11.95 and $13.95 for single and double bed sizes. Owners of PB-5 blankets, produced just after the war, are being urged to replace them, at an exchange price of $19.95.

Variety Improves Lighting Effect

Sylvania Electric Products, Inc

RELIEF from the monotonous appearance of louvered lighting is provided in the J. Goldsmith & Sons department store in Memphis, Tenn., by recessed troffers and incandescent down lights. Maintained intensity under the louvered ceiling is approximately 50 ft-c



New Arrester

Westinghouse Type LX provides 20,000 amperes ...highest short circuit capacity available today!

Here's a completely new expulsion-type arrester that brings you the kind of protection you've been looking for. Note how these features contribute to more positive protection . . . longer arrester life.

Highly current limiting—a longer arc path over a spiral course limits follow current flow through the arrester to a fraction of available fault current.

High surge discharge capacity—well over NEMA requirement of 65,000 amperes.

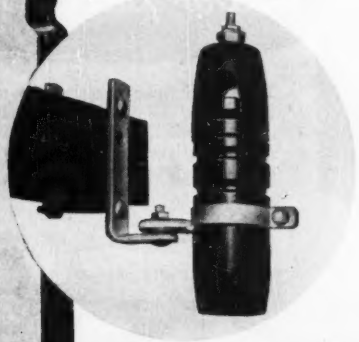
Low and consistent sparkover—skillful design has produced a gap of considerable length which sparks over at very low value.

Low IR drop—since the arc drop is the only voltage that appears across the arrester during the flow of surge current, the discharge voltage is inherently low.

Operating elements totally enclosed—available with enclosed isolating gap (as shown) or with external isolating gap at bottom. With polyethylene cap (slight extra cost), fully enclosed type has no exposed metal parts at line, ground or intermediate potential. Cap pushes on; no metal springs, no turning necessary.

Easy voltage identification—each ring on main porcelain body indicates 3 kv of rating. For example, cutaway arrester pictured is 9 kv, arrester in inset is 3 kv.

Longer life—limitation of power follow current insures exceptionally long arrester life.



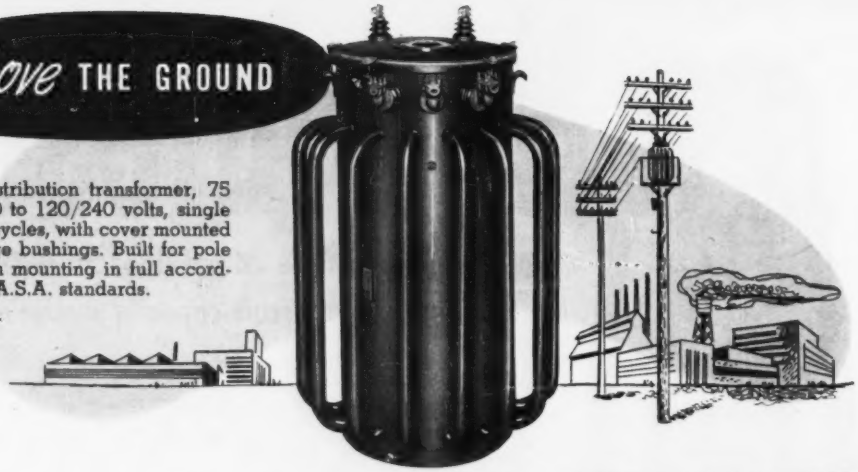
Descriptive Bulletin 38-150 explains how this revolutionary new LX design brings you these matchless benefits. Ask your Westinghouse representative for a copy or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60764

3-kv, Type-LX, "De-ion®" Expulsion Lightning Arrester with crossarm mounting bracket. This arrester has a short-circuit rating of 20,000 amperes. Ratings range from 3 to 15 kv.

YOU CAN BE SURE... IF IT'S
Westinghouse
LIGHTNING ARRESTERS

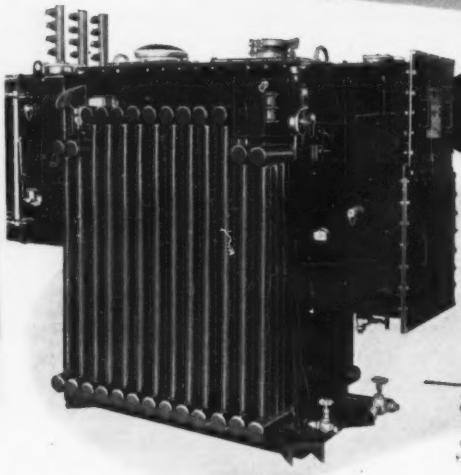
Above THE GROUND

Type A distribution transformer, 75 KVA, 2400 to 120/240 volts, single phase, 60 cycles, with cover mounted high voltage bushings. Built for pole or crossarm mounting in full accordance with A.S.A. standards.



Standard

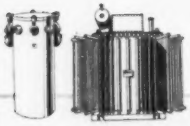
TRADE MARK



Under THE GROUND

Type HTS Askarel subway type network transformer, 500 KVA, 12,470 to 216Y/125 volts, 3 phase, 60 cycles, complete with high voltage disconnect and grounding switch, low voltage network protector, and electrical interlocks.

Transformers FOR EVERY APPLICATION



Liquid filled (sizes up to 10,000 KVA and 72 KV inc.)

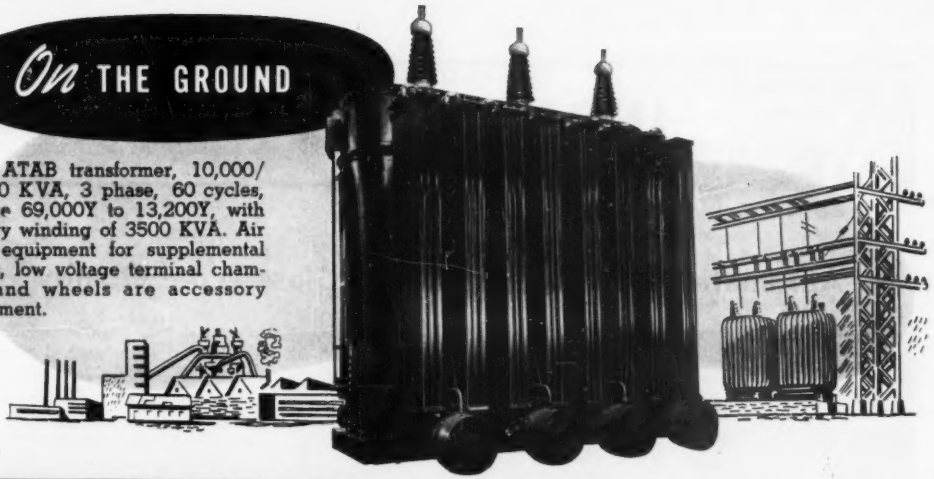
Instrument transformers (for use on circuits up to 72,000 volts, inc.)

Dry type (up to 1000 KVA and max. voltage ratings of 4800.)

Control transformers (compound filled or open type.)

On THE GROUND

Type ATAB transformer, 10,000/12,500 KVA, 3 phase, 60 cycles, voltage 69,000Y to 13,200Y, with tertiary winding of 3500 KVA. Air blast equipment for supplemental rating, low voltage terminal chamber and wheels are accessory equipment.



TRANSFORMERS AT EVERY LEVEL

Installed on thousands of poles throughout the electrical distribution system. On the ground stepping-up or stepping-down at substations. Underground at network load centers. You find STANDARD transformers operating at every level because . . .

. . . users of electrical equipment, having learned through actual experience, place their confidence in the transformers that are built "right" from the ground up. Designed by topflight engineers, constructed by craftsmen who know the importance of following instructions to the letter, then . . .

. . . tested by STANDARD, a recognized leader in the manufacture of Testing transformers. Thus possible future trouble spots are located and eliminated before the transformer leaves the factory. Fully protected from the ravages of dust, dirt, fumes and dampness. Rugged construction allows STANDARD transformers to be used anywhere. Next time remember . . . STANDARD TRANSFORMERS.

Standard

The Standard Transformer Co.

Warren, Ohio

Representatives in principal cities

Automatic Heat Control Betters Glass Wool Quality

General Electric Co

CONTROL BOARD of automatic temperature control system which holds glass fiber processing temperatures constant, saves manhours, and improves quality of product

A temperature control system which automatically maintains a constant white heat for the production of glass "threads" 60 times finer than a human hair has been put into operation by the Owens-Corning Fiberglas Corp, Santa Clara, Cal.

This control holds processing temperatures at a constant point above 2000 F. The new method brings increased dependability of operation, improved quality control, increased production, and a marked decrease in the quantity of waste, according to Owens-Corning engineers. The transition from manual to automatic control also has resulted in an important saving in manhours. One man now is able to control the entire operation, and do the job more effectively.

In addition to 18 reactor type control units and 16 saturable reactors to regulate the flow of electric power, an air circuit breaker and a polyphase watthour meter are also included in the equipment used.

In forming the threads, white-hot glass flows from furnaces into narrow channels pierced by hundreds of tiny perforations. As the streams of molten glass pour through the perforations, jets of high-pressure steam blow them into the finer-than-hair fibers. Any marked deviation in temperature would seriously impair the quality of the fibers.

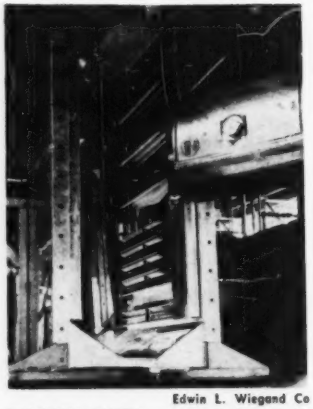
Controlled Infrared Oven Saves on Drying Parts

Drying of tractor parts has been improved by changing from manually directed hot air blast to a controlled electric infrared oven at Harry Ferguson, Inc, Detroit tractor manufacturers. The new conveyorized setup automatically dries parts of widely varying sizes and shapes for paint spraying. Substantial savings are said to have resulted from the changeover in drying methods.

Arrangement of the heaters in the oven is shown in the accompanying photograph. Each of the two oven halves contains 14 electric radiant heaters—six vertical ones rated at 2.5 kw each and eight horizontal ones rated at 1.8 kw each. The latter are spaced so as to concentrate more heat in the area through which the heaviest sections of metal pass. Heaters are operated at 230v. A power blower located behind the vertical heaters drives high velocity air through the oven.

The metal parts are conveyed through the 8-ft oven at a rate of 25 ft per min, and the temperature of the parts is raised well above boiling point in the 20-sec exposure time. Parts leave the oven and cool in the 50-ft travel to the paint booth.

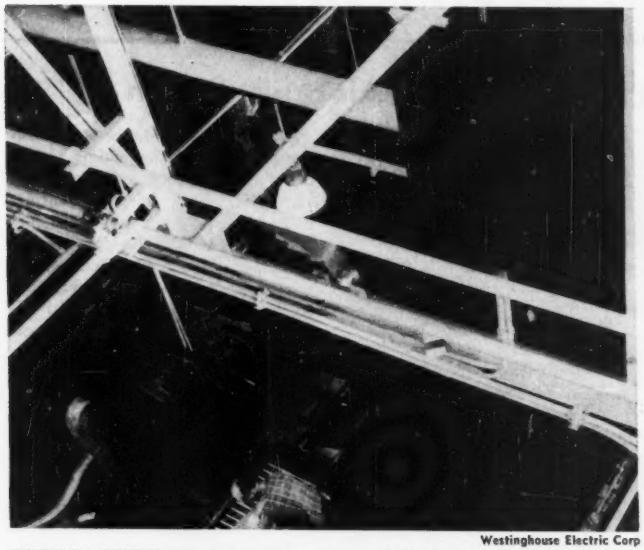
Because of soldered joints on the fuel tank, the heaters are equipped with variable heat control. Heat is applied at the highest intensity possible without softening the soldered joints.



Edwin L. Wiegand Co

TRACTOR PARTS are raised above boiling point temperature in 20-sec exposure in 8-ft radiant infrared oven.

Truss-Mounted Rectifier Provides d-c



Westinghouse Electric Corp

SELENIUM RECTIFIER mounted on truss (upper right) and plugged into adjacent bus duct, gives quick, economical d-c power supply to 3 hp punch-press motor at the Westinghouse Beaver (Pa) Division plant. The small total load from scattered d-c machine tools does not warrant the use of d-c motor-generator sets and a number of separate distribution feeders

Oil Company Uses Electric Heat

Continental Radiant Glass Heating Corp

RADIANT GLASS electric heating panels provide heat for the Culver City Bulk Distributing Plant of the Standard Oil Co of California. Employees may sit close to these units without discomfort, yet adequate heat is provided for entire room. The use of ducts, pipe, etc, was not required in construction, thus saving time and expense. Each room is separately controlled with a thermostat. Operating costs and installation time are said to be economical.

INDUSTRIAL BRIEFS

Degreasing Parts of auto generators and starters by 6-kw electric degreaser at Franklin Products Co, Philadelphia, Pa., saves 60% of time formerly required to wash parts by hand in chemicals. Cleaning job is more thorough. L. Albertson, Application Engineer, Philadelphia Electric Co.

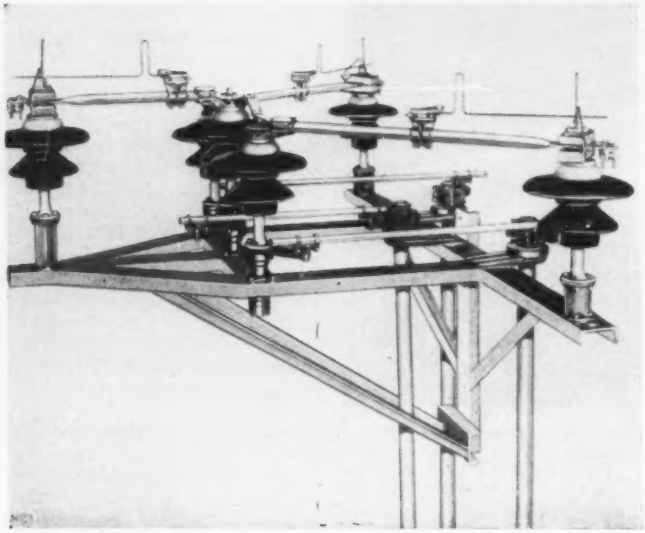
Automobile Refinishing jobs are done in a 60-kw infrared oven in 7 hrs by the Granite Chevrolet Co, Quincy, Mass. This includes 50 min spraying with enamel paint after washing and vacuum cleaning, and an average of 20 min baking. Finish is baked with 20 kw at a cost of about 50¢ a car. Infrared oven is sealed directly to the spray painting section to prevent dust collection on the wet surface. Quincy Electric Light & Power power sales engineer, J. F. Eich was responsible for this job.

Special Inspection Lighting in finishing room of Harding Jones Paper Co, Excelli, Ohio, has improved quantity and quality of production. When mounted on finishing table opposite operator's position with proper directional focus across horizontal plane of the paper sheets, imperfections are easily perceptible. Glare is greatly reduced. Continuous inspection by operator can be comfortably made over long periods. Special units housing five 5½ in. diam auto lamps are used. These low vo lamps have a narrow vertical li tribution with high beam candlep H. E. Vogel, Industrial Lighting gineer, Cincinnati Gas & Electric Co.

Shutdown and Removal of nearly 10,000 kw in generating units and purchase of central station power saved over 25,000 sq ft of valuable floor space for production machinery in modernizing the North Grosvenor-Dale, Conn., plant of Cluett, Peabody & Co, Inc. Six boilers and two turbine units were replaced. A modern industrial electrical control center now occupies space formerly taken by an old hydro unit. A carding room was built on top of the former boiler room. Two dozen high-speed spinning frames now are housed in the former turbine and switch control rooms.

NEW EQUIPMENT

Pole Mounted Gang-operated Air-break Switch



The Three-Way Matthews GOABS mounts on one pole and is ideally suited for substation switching, loop interconnections or sectionalizing. Each set of blades is individually operated and gives the operator the advantage of doing all switching from one point. Switch also provides greater safety by providing 180 degrees of free climbing space. Company states it will be quite improbable that a lineman will open or close the wrong switch because of different switch locations.

Switch has ability to break charging current on long lines. This was proven in field tests where the 69-kv GOABS cleared the charging current on 61.5 miles of 66-kv lines.

These air break switches are available in 15, 23, 34.5, 46 and 69 kv 600 amp ratings.

W. N. Matthews Corp, 3850 Delor St, St. Louis 16, Mo.

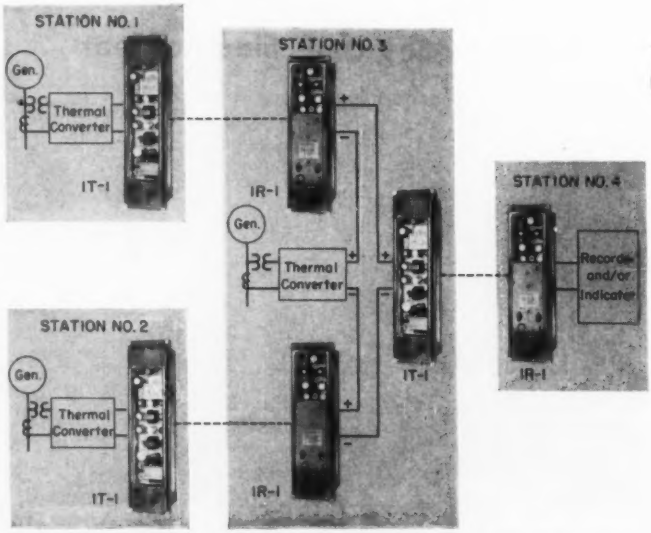
Telemetering Equipment

Faster telemetering response (less than 0.3 second exclusive of end devices) is possible with the new millivolt-input Free-O-Tron telemetering equipment.

Designed to provide remote metering of any quantity than can be converted to a proportional millivolt quantity, this equipment will transmit any value by use of either a microwave, power line carrier, or pilot wire medium.

Flexibility of operation makes possible totalization of similar quantities at either the measuring stations, intermediate stations, or receiving stations.

Consisting of a new type IT-1 transmitter and IR-1 receiver, the Freq-O-Tron equipment is calibrated to the individual customer's requirements and can be supplied as a complete installation including carrier or microwave communication systems.



Pictured above is the arrangement for the telemetering of two separate stations. Totalizing is then done at an intermediate station by the simple series addition of IR-1 receivers and a third station thermal converter. The total generation can be retransmitted as a single quantity without the need for any type of intermediate converting equipment.

Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

Made to Hold—
Made to Last

HUBBARD
No.....4-11-44
WIREHOLDERS

IF there's anything to get hold of, Hubbard 4-11-44's take a grip—and keep it. The screw is sharp pointed for easy starting by hand. The threads are deep, sharp, clean-cut, and the root diameter increases slowly. This gradual taper means easier insertion and a better hold . . . and the threads are cut clear to the base, so that the screw takes a grip in material considerably thinner than the full screw length. The screws are made of galvanized steel. The same wireholder, with different stock numbers, may be obtained, if desired, with non-ferrous and longer screws, toggle bolts, carriage bolts, and stud bolts.

And note the construction of the insulator; tensile strain is taken by metal, the porcelain is subjected to compression strain only. "Metal parts in tension—porcelain parts in compression" has been a principle of Hubbard Wireholder design for more than 35 years. The porcelain is accurately molded to avoid high spots; and the wire bail is sufficiently flexible to adjust itself to the contour of the insulator.

Hubbard 4-11-44 Wireholders far surpass recommended ratings on standard house service conductors. Millions of installations have proven their unfailing dependability.

HUBBARD AND COMPANY
ESTABLISHED 1843
PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA
"Hang the load on Hubbard Hardware!"

NOTHING PERFORMS BETTER WITH ALUMINUM CONDUCTORS THAN CAST ALUMINUM

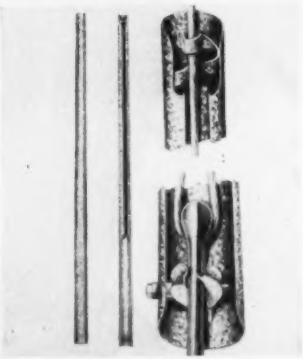
POWER SUBSTATION
CONNECTORS AND FITTINGS
Our Products are Quality Controlled from Ingot to Finished Product
TRANSMISSION SYSTEM
CLAMPS AND CONNECTORS
DISTRIBUTION SYSTEM CONNECTORS AND ACCESSORIES

● Backed by many years of coordinated electrical, mechanical and metallurgical knowledge and experience in the design and manufacture of cast aluminum electrical products.

Consult one of our nearest 18 representatives or contact our main office.

ANDERSON BRASS WORKS, Inc.
POST OFFICE DRAWER 2151
BIRMINGHAM, 1, ALABAMA

● BRONZE AND ALUMINUM POWER CONNECTORS, FITTINGS AND BUS SUPPORTS
ALUMINUM SUSPENSION AND STRAIN CLAMPS



Guy Wire Protector

This new 18 gauge steel guy wire protector has a 30-inch cutaway opening at the bottom which permits installation over an anchor rod and two 6-inch guy clamps in series.

It is available in 7 and 8 foot lengths.

Installation is made by means of a base clamp which is tightened conveniently from the side with one bolt. Protector will not twist after clamp has been tightened. Attachment at the top of the protector is made by means of a hook to guy strand of any diameter from ¼ to ½ inch. This hook reportedly holds the strand so tightly there is little possibility of rattling.

Line Material Co, Milwaukee 1, Wis.

•

Plastic Electrical Tape

A heavy duty electrical tape designed for applications requiring more-than-average mechanical

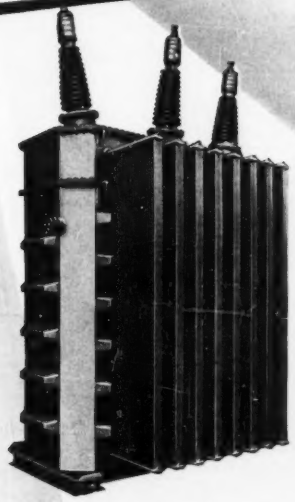
(*Continued on page* 104)

Wagner
TRANSFORMERS
. . . the choice of leaders in industry

WAGNER POWER TRANSFORMERS

QUALITY . . . ALL THE WAY THROUGH

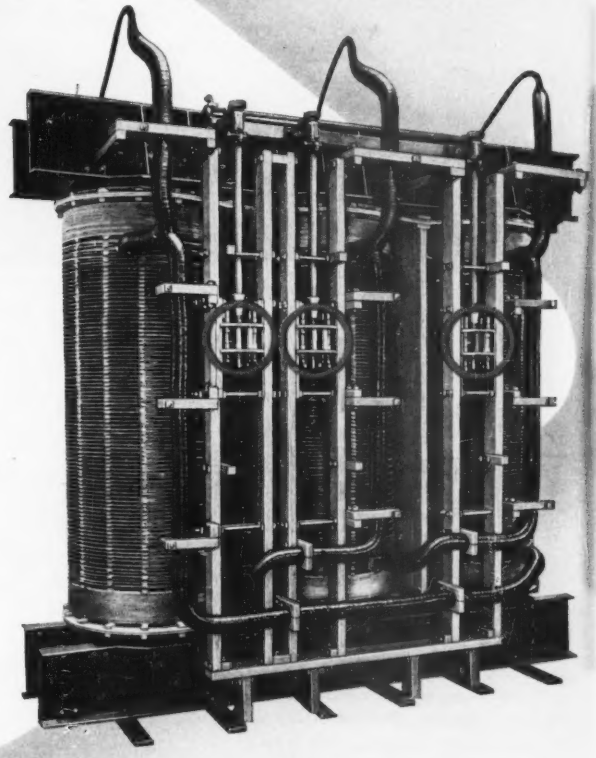
Wagner Power Transformers have a reputation for quality —inside and out—established through sixty years of service to the power industry and proved by service records from the field, dating back to the early 1900's. They are liberally designed and are built with painstaking care to enable them to give years of uninterrupted service. Use of highest quality materials and rigid inspection and tests have made Wagner Power Transformers "the choice of leaders in industry."



Wagner Power Transformer Elements are particularly outstanding because of their inherent strength and stability and because of their compact design and careful construction. They have sufficient capacity to not only carry their normal load but to be able to handle an overload when the emergency arises. That's why Wagner Transformers have established records for continuous service and long life in all types of industrial plants and transmission lines.

Bulletin TU-181 tells the complete story . . . you should have a copy. Consult the nearest Wagner branch for advice on your next transformer installation.

Snap acting rotary type tap changers, designed to permit changing the voltage ratio quickly and effectively, are located near the taps and are connected for gang operation from a single operating handle outside the tank.



WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

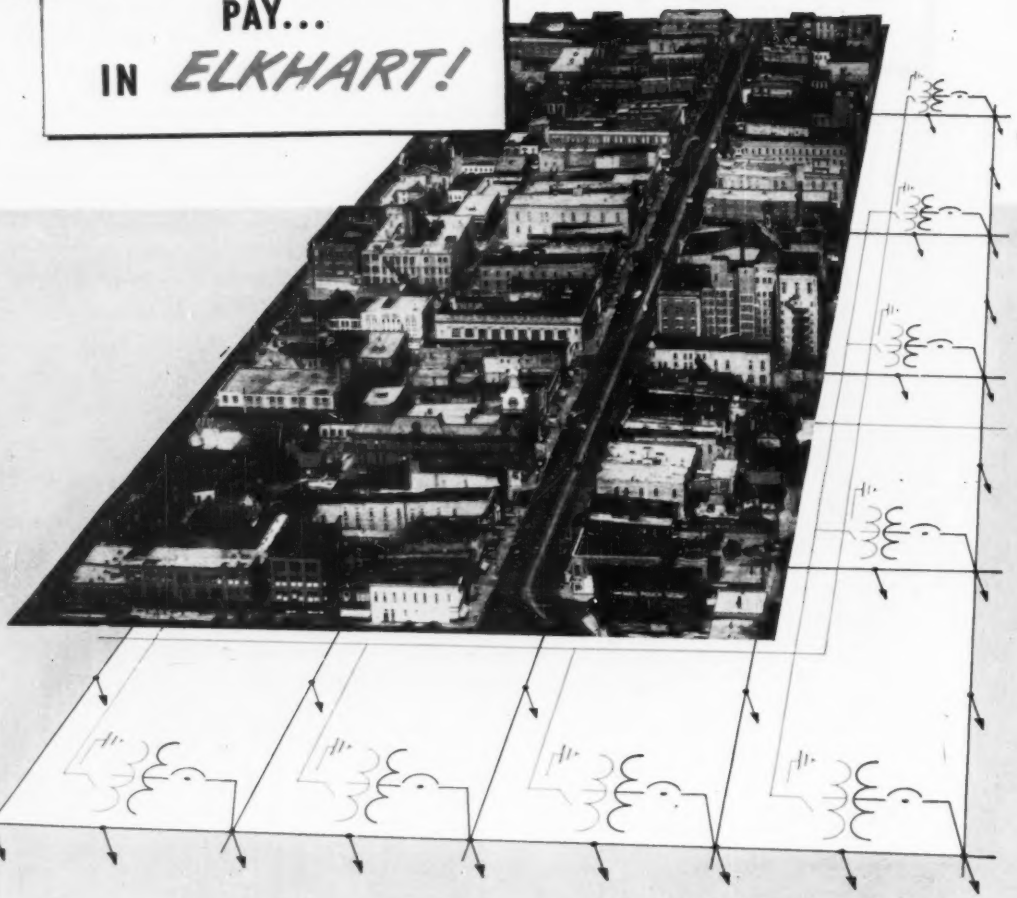
ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS • AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

Wagner Electric Corporation
1891 1951

TU-4

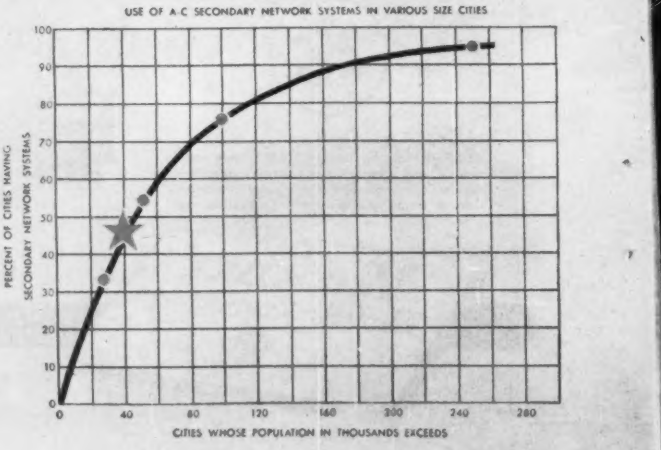
NETWORK SYSTEMS PAY... IN *ELKHART!*



FACTS ABOUT ELKHART'S A-C SECONDARY NETWORK SYSTEM.

The secondary network system is supplied from 13 vaults having a total capacity of 3,900 kva. The area covered by Elkhart's network is almost 20 square blocks, containing 3.61 miles of conduit, 5.47 miles of primaries and 2.27 miles of secondary feeders.

One third of all cities in the United States with a population of 25,000 or more have network systems, while one half of all cities with a population of 50,000 or more have network systems.



17 years' uninterrupted service... no voltage-regulation problems

There's no power service problem in the business district of this bustling Indiana town of 40,000 . . . they took care of that 17 years ago. Then, Elkhart was struggling with an overloaded radial system, consisting of 3-phase primaries and both 3-phase and single-phase secondaries . . . tranformers were mounted on practically every pole. The Fire Department and fire underwriters were concerned . . . the utility was plagued with voltage-regulation problems.

OVER AND UNDER . . . In 1934 the Indiana and Michigan Electric Company met the problems of Elkhart's business district by installing an *A-C Secondary Network System.* Transformers and primaries were placed underground . . . the secondaries and services overhead. This overhead and underground combination, particularly applicable to smaller cities and towns, made possible great economy in the original installation cost.

IMPROVED SERVICE . . . The A-C Secondary Network System has resulted in a high standard of continuity of service and uniformly good voltage-regulation, not attainable through radial distribution systems. Underground placement of the primaries and transformers has greatly reduced congestion and improved appearance.

ABOUT MAINTENANCE . . . Maintenance story here is typical of all users of secondary networks . . . it's low, almost negligible. The utility reports that in 17 years of operation, there has never been a complete interruption of the system. Underground crews like the convenience of maintaining the system. They know . . . they work with the equipment.

CUSTOMERS AND UTILITIES BENEFIT . . . Utility customers appreciate the high-quality service and uniformly good voltage-regulation afforded by network service. The utility benefits from reduced operating and maintenance expense and improved customer good will. Large or small, your town can have high-quality network service . . . at a cost commensurate with the benefits this service affords. Westinghouse makes this equipment and can help in your planning. Call or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-97155

YOU CAN BE SURE.. IF IT'S
Westinghouse
NETWORK EQUIPMENT

Line foreman has trouble, calls for materials fast.

"RCA 2-WAY RADIO

cuts our outage time 90%"

says Mr. Milton Sturdivant,
Superintendent of Construction and Maintenance,
Brazos River Transmission Electric Co-operative, Texas

"WITH RADIO, our crew is on the job as fast as it formerly took us to reach a phone. *Radio is indispensable* . . . we just couldn't function without it."

RCA Radio covers big Texas utility

The Brazos River System stretches out over 100,000 square miles of Texas . . . includes steam plants, hydro plants, and 1000 miles of 69 KV lines. RCA 2-way radio operates from seven base stations in power plants, linemen's homes, and 28 mobile stations in cars, pick-ups, and trucks. Maintains instant voice contact between supervisors, foremen, load dispatchers, line crews, line patrolmen. Three years on the job, 2-way radio is giving the vital communications that keeps the system running smoothly.

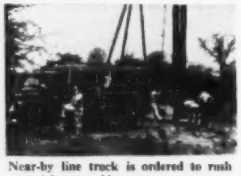
Could your operation use radio?

Everywhere it's applied, *RCA 2-way radio works wonders*. Saves time, manpower, money. Ends aimless driving. Saves wear and tear. Speeds repairs in emergencies. Pays for itself many times over through better, more efficient operation.

Radio easy to install—operate—maintain

Mobile units are compact, rugged . . . can be installed in truck or car quickly and efficiently. Easily maintained, use standard tubes. Central transmitter serves any number of mobile units. Designed and backed by RCA . . . world leader in radio.

Get full story on RCA 2-way radio now. See how it can help out on your operation. Mail coupon . . . TODAY.



Near-by line truck is ordered to rush materials to trouble spot.

Meanwhile field superintendent also drives to trouble spot.

Dept. 45XE, RCA Engineering Products Department, Camden, N. J.

Please send my FREE copy of illustrated booklet on how RCA 2-way radio can save time, manpower, and money for me.

Name_____

Title_____

Company_____

Address_____ City_____ State_____

RCA **RADIO CORPORATION of AMERICA**

strength has been announced recently. Designated Scotch brand electrical tape No 21, it is recommended for anti-corrosion protection of pipes, cables and equipment laid underground where resistance to cuts and abrasions during backfilling operations is an important consideration.

Tape is also used for protecting and insulating cable and high tension leads subject to wear and rough handling, and for bus bars subject to high voltages.

Black, with a vinyl plastic backing 20 mils thick, tape has a di-electric strength of 22,500 v, an insulation resistance of 200,000 megohms and an electrolytic corrosion factor of 1.0. Tape is available in 36 yd rolls from ¼-in. to 16-in. in width.

Minnesota Mining and Mfg Co, 900 Fauquier St, St. Paul 6, Minn.

•

Fusible Panelboard Line

Four branch circuits contained in one piece molded bakelite blocks comprise the heart of the NTPR fusible panelboard line.

These panel boards are now available with main lugs or main switches from 4 to 40 branch circuits for use on ac or dc applications.

Square D Co, 6060 Rivard St, Detroit 11, Mich.

•

Triple Geared Reduction Motor

Through triple gearing, the new type GM Syncrogear motor reportedly delivers high torque at low speed ratios up to 175 to 1. By the use of two secondary pinions driving the output gear, the effective torque rating is doubled.

The load is distributed equally be-

Announcing **Low Cost...**

OVERLOAD INDICATOR

ALLIS-CHALMERS
DISTRIBUTION TRANSFORMERS

ONE OF THE MOST IMPORTANT advantages of the new A-C distribution transformer overload indicator is that it operates purely as a signal. This warning device locates overloaded transformers visually, but does not in any way interrupt service to your customers. And when poor voltage conditions are corrected, naturally customer relations are improved. The warning device is simple, reliable, quiet in operation and low in cost.

Use of the overload indicator enables you to schedule the replacing of overloaded transformers during daylight hours. It will save you money on the maintenance and replacement of transformers and prevent costly burnouts.

OPERATION IS SIMPLE

Operated from a simple thermal device located in the top oil, the warning signal lights up brilliantly when the transformer becomes moderately overloaded. It remains lighted until reset with the convenient external handle.

The Allis-Chalmers overload indicator is available on distribution transformers of any rating.

Why not investigate the advantages of Allis-Chalmers distribution transformers with the overload indicator today. Simply call your nearby A-C district office or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3543

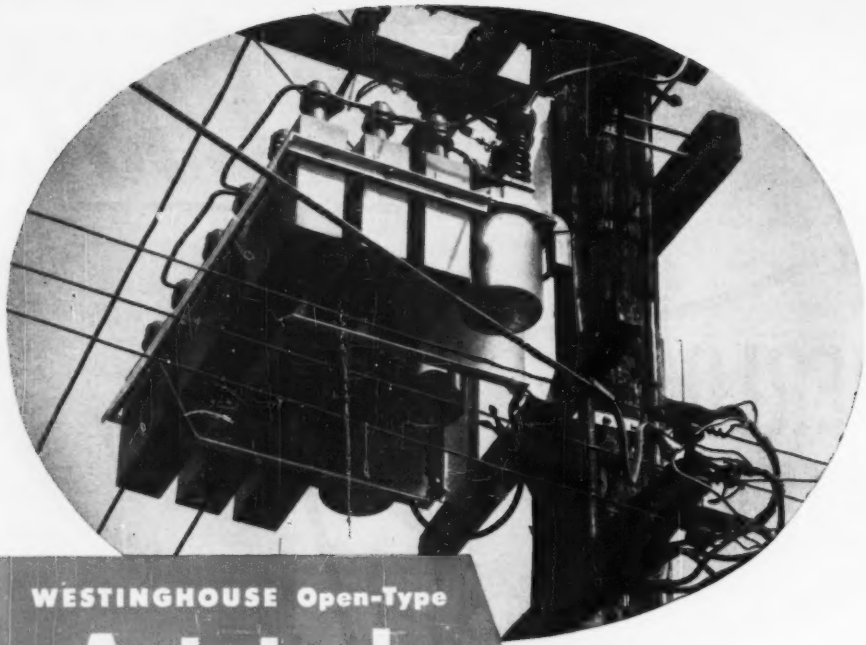
Here's What Utility Men Are Saying:

"Its big advantage is that it warns of overloads but doesn't interrupt service. That means better customer relations for us."

"The new indicator is a low-cost substitute for our expensive load surveys. We can make definite savings in overhead costs."

"We like it from an engineering standpoint. It's a well-designed warning system . . . well engineered and well calibrated. And it is built right into the distribution transformer at the factory."

ALLIS-CHALMERS A-C



WESTINGHOUSE Open-Type

Autotrol

The automatically switched capacitor equipment that costs you less than $6.00 per kvar

Here's complete, lightweight, automatically switched capacitor equipment for pole crossarm mounting. Costing less than $6.00 per kvar—Westinghouse Open-Type Autotrols* answer your need for low-cost unit equipment for power-factor improvement at any location on your system. And look at the features you get when you specify Autotrols:

High rating . . . 225 and 300 kvar, 2400 volts delta to 13,800 volts wye.

High-Capacity Switch . . . Type CSO-1 oil switches provide sufficient current capacity to switch from 600 kvar at 2400 volts up to 1800 kvar 3-phase capacity at 13,800 volts.

A complete Unit . . . Individual capacitor units, switches, and terminal caps, assembled, connected, and shipped as a complete package.

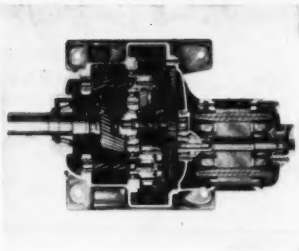
Simple, flexible installations . . . merely complete line and control connections and the equipment is in service. Kilovar adjustment can be made by varying the number and size of the capacitor units.

Performance-proved capacitors . . . the Autotrol is equipped with standard distribution-type Inerteen® capacitors featuring solder-sealed bushings and zinc spray, weatherproof finish.

For complete information on Westinghouse Autotrols ask your Westinghouse Representative for SA-6812, or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60771

YOU CAN BE SURE...IF IT'S
Westinghouse
CAPACITORS

*T.M.



tween the two pinions by a splined herringbone pinion.

The motor is available in ratings of 1 to 10 hp, with speed ranges of from 5 to 25 rpm. Features include normalized castings, asbestos-pocketed windings, solid centricast rotor and lubriflush lubrication. Motor greatly reduces the space necessary to house this type of drive.

U. S. Electrical Motors Inc, 200 E Slauson Ave, Los Angeles 54, Calif.

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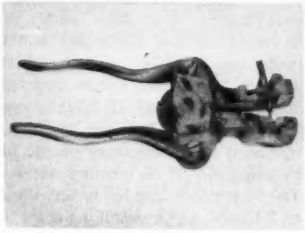

Wire Stripper

A new tool, the Speedex Automatic 766-I features a delayed action release which reportedly prevents wire crushing or bending.

Stripper is designed for industrial and heavy duty use stripping solid as well as stranded wire from 8 to 22 gauge.

Wood Specialty Manufacturing Co, 915 Taylor Ave., Rockford, Ill.

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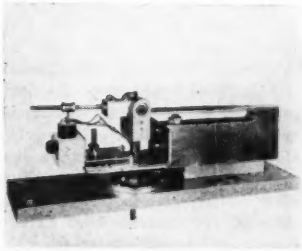

Cantilever Beam Load Cell

This new load cell operates on the cantilever principle. Mechanical force applied to the cell is converted to a proportionate electrical signal that is transmitted to an indicator or recorder for evaluation.

There are 3000 measurable parts of full load capacity when used with an Oteotran null-balance indicator or recording system. Available in standard ranges from 5 to 500 lbs.

Automatic Temperature Control Co, 5200 Pulaski Ave., Philadelphia 44, Pa.

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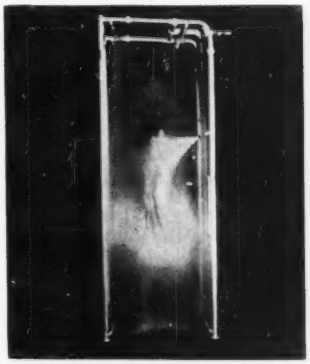

Emergency Shower

The new Logan showers (offered in three basic models) spray water to rapidly quench fire, dilute and remove acids or other chemicals from clothing and body.

Logan Emergency Showers, Inc, Glendale, Calif.

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High Capacity Expulsion Arrester

A new De-ion expulsion-type lightning arrester, the type LX, incorporates a new method of limiting power follow current on systems having fault currents as high as 20,000 amps.

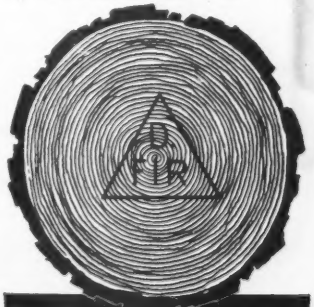
A spiral fiber filler provides longer arrester life and positive protection by lengthening the power arc path to four times the original spark path. As a result the power follow through is limited to a fraction of the available fault current.

Sparkover values are kept low by high field stresses between the upper electrode and the metal shield surrounding the fiber arc chamber. A steel reinforced arc chamber and the spiral groove in the fiber filler, which store gases generated during surge discharge, make the arrester capable of

FOR LONG LIFE and low service cost, the big 3 in western poles are Western Larch — Lodgepole Pine — Douglas Fir.

All 3 are grown on the virgin forest lands of the J. Neils Lumber Company in western Montana. All 3 are produced and treated in J. Neils modern pole plant at Libby, Montana.

J. Neils Lumber Company, since 1895 a quality manufacturer of forest products, invites your inquiry on transmission and telephone poles. An illustrated folder on J. Neils treated poles, and information regarding their application to your own requirements, will be furnished on request.



POLE DIVISION

J. Neils Lumber Company

J N

Libby, Montana

withstanding surge currents in excess of 65,000 amps.

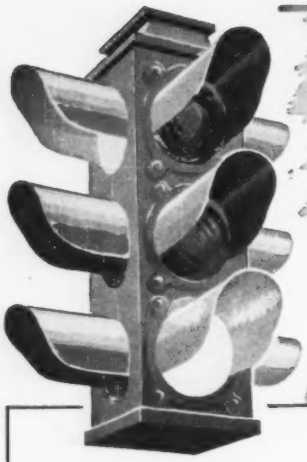
The type LX arrester is available in ratings of 3, 6, and 9 kv and will later be made available in ratings of 12, 15, and 18 kv.

Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

MORE NEW PRODUCTS
about which you should know

Eutectic Welding Alloys Corp, Flushing, N. Y., announces a **new plastic cement compound,** Form-A-Jig which will not deform, move, or swell during welding operations. It is claimed to be a swift, simple, inexpensive substitute for a metal jig. Compound will not soil metal or mar the surface nor will it corrode. . . . General Electric Co, Syracuse, N. Y., has developed a **new 25-50 mc mobile radio** for operation in both 20 kc and 40 kc channel widths and featuring quadra-tuned IF transformers in the receivers. Receiver for 20 kc operation has a selectivity of 100 db by using the 20 db quieting method. The 30-w transmitter has battery drain of 2.3 amps and transmitting drain of 38 amps at 6.3 v. Receiver battery drain is 6 amps at 6.3 v and 3 amps at 12.6 v.

Eagle Electric Mfg Co, 23-10 Bridge Plaza South, Long Island City, N. Y., has designed a **surface range outlet** for electric range connection and industrial application. Special "Slip Lock" pressure terminals assure good connections. Knockouts are provided in back of unit for either ¾ in. or 1 in. sizes. Underwriter's ratings are 3-wire, 50 amp, 250 v, and 4¾ x 2½ x 2⅛ inches. . . . Tartak Stolle Electronics, Inc, Los Angeles, Calif., has developed a new type, **silver brazing, self-contained solder pot.** Operating at 117 v ac, pot brazes enamel insulated wires without stripping, insures perfect joints, reduces rejects, and is designed for high temperature silver solder or 50-50 lead solder dripping applications. Unit includes rheostat and manual control for maintaining temperature levels. Unit is 12¾ in. deep, 10⅝ in. high, 8½ in. wide, and weighs 32 lbs.



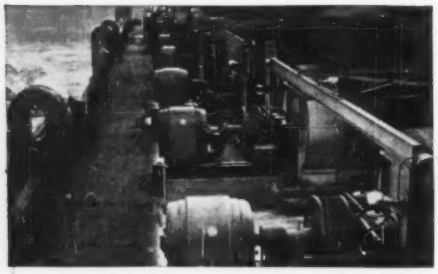
DRAFT FANS GO on GREEN

A Big Draft Job Handled Capably by Green Fans

Twenty-four large Green Fans take care of a heavy draft load at the Venice (Illinois) Plant of the Union Electric Co. of Missouri. Each of six boilers has two sets of Green Fans, each set consisting of one induced draft fan and one forced draft fan coupled to one motor as a unit. With the heavy demands on this station, all boilers are usually in service continuously, thus throwing an unrelenting burden on the fans.

Engineers whose responsibility it is to recommend or accept draft fans for large power plants certainly want efficiency and low operating costs. But they don't overlook the maintenance and replacement angles. They want the sound designs of competent experienced fan engineers. They also want the care in construction that is found in shops of a company that has built up an international reputation as the "authority" on draft fans. They know that such a company will not tolerate sloppy shop work.

Green is this authority on mechanical draft fans.



Have You a Copy of Our Fan Bulletin No. 168? If not, we shall be glad to send you one.

THE GREEN Fuel Economizer COMPANY INC.

BEACON 3, NEW YORK

ECONOMIZERS • FANS • AIR HEATERS • CINDERTRAPS

THERE ARE MANY PROTECTED POLE TYPE TRANSFORMERS

but only ONE PROTECTED POLE STAR

All the Advantages of the POLE STAR, plus

- LIGHTNING ARRESTERS
- PROTECTIVE LINK
- LOW VOLTAGE BREAKER
- SIGNAL LIGHT AND BREAKER OPERATING HANDLE
- EMERGENCY BREAKER CONTROL
- GROUND DISCHARGE GAP or GROUND CONNECTOR

MANY distribution transformers are equipped with safety devices for maximum electrical protection. But only the Transformer manufactured by Pennsylvania gives you this protection PLUS the many decided advantages of Pole Star design and construction.

IN THE POLE STAR, Pennsylvania gives you a small, light, efficient transformer. The exclusive *Pennsylvania-Developed* and *Pennsylvania-Engineered* design gives you a transformer with an inherent low exciting current and a core that can easily be disassembled and rebuilt without appreciably affecting the original core loss or exciting current. And, the POLE STAR gives you added protection with its Sealed Tank construction and retained synthetic rubber gaskets.

Let the POLE STAR be your guide

PENNSYLVANIA POLE STAR TRANSFORMER

Product
Of
Long
Experience

Safe
Thrifty
And
Reliable

Pennsylvania **TRANSFORMER COMPANY**

CANONSBURG, PENNA. *Greater Pittsburgh District*

WHY VICTOR PINTYPES KEEP DISTRIBUTION COSTS DOWN

V RUGGED, THICK CROSS SECTION gives maximum strength and resistance to impact.

V LARGE RADIUS TOP AND SIDE WIRE GROOVES make hot-tieing easy and quick.

V SMOOTH CONTOUR *plus* smooth, hard glaze give unsurpassed self-cleaning characteristics—ideal for contaminated areas.

V MAXIMUM LEAKAGE DISTANCE conserves current, helps maintain rated voltage, and minimizes outages.

V EACH VICTOR LOW-VOLTAGE PINTYPE is individually inspected at every point of manufacture.

V HIGHEST QUALITY WET PROCESS PORCELAIN provides highest dielectric and physical strength.

VICTOR NO. 5 LOW-VOLTAGE PINTYPE. For complete engineering data on this insulator and other sizes and types, write today for Bulletin No. 4.

These are only a few of the reasons why VICTOR Low Voltage Pintype Insulators are famous for performance *and* economy. They last longer—give *extra* years of service—cut line maintenance costs to a minimum. Power men everywhere prefer VICTOR Pintypes!

Do You Know that...

The first wet process porcelain insulators were produced at Victor in 1893. In fact, many of our skilled craftsmen have been making high quality porcelain insulators at Victor for over 40 years.

Specify

VICTOR PINTYPE INSULATORS

VICTOR INSULATORS, INC. VICTOR, N. Y.

WHAT THEY'RE SAYING
at industry meetings

Rising Costs and Utility Regulation

James R. Durfee, *Wisconsin Public Service Comm, before convention of Wisconsin Utilities Association*

In the state of Wisconsin, the increase in utility rates over the 1939 rates are up 46% for telephone rates, up 12% for water rates, up 10% for gas rates, and down 6% for electric rates.

This position of electric rates is due largely to better performance of recent plant additions designed to use lower-priced fuels, to greater water power efficiency and improved transmission methods. The production of electricity however, is becoming a tighter race between improved performance and rising costs of labor, materials and taxes.

A regulatory commission exercises price control over utilities but such controls cannot retard or cure an inflation that already exists.

The Public Service Commission of Wisconsin must fix rates that are reasonable, and that means reasonable to the customer and reasonable to the utility. Anyone who disputes this fundamental principle of utility regulation had better quit shadow-boxing with our American free enterprise system and come out in the open.

The customer should be made to understand that the taxing authorities are responsible for a substantial portion of his utility bill, and that this is a matter over which neither the Commission nor the utility has any control.

Our Present Economy

W. C. Mullendore, *president, Southern California Edison Co, before California Manufacturers Assoc*

We are in the midst of an uncontrolled inflation which has caused the judgment of businessmen, with respect to values, prices, and markets, to be seriously unbalanced. Our present day fast business pace and large factory output is a false prosperity.

As it has been two decades since the laws of economics have been allowed to operate without government interference, business men cannot appraise the future on past experience.

Business leaders who now make permanent investments in new productive capacity are only supplying a temporary demand. Southern California Edison is also required to supply a temporary excessive demand and to do this must make permanent investments of capital and construct permanent structures.

Present business conditions are the result of abnormalities arising from:

1. A transition from limited government and free enterprise to a system of a government of unlimited powers and a more socialistic economy.
2. A long period of war and war preparation.
3. Inflation and expansion of demand resulting from an unprecedented expansion of debt and the monetization thereof.

Municipal Utilities and the Defense Effort

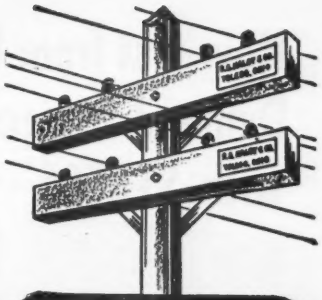
F. A. Kolb, *special assistant to the administrator, DEPA at a convention of the Kansas Assoc. of Municipal Utilities*

Military alone will take 40% of the aluminum and brass mill products during the first quarter of 1952, even though defense will take only 20% of this nation's production.

"Why must the electric power in this country be expanded by 40% in three years when the country's total production will expand only 20%" is the charge that DEPA is frequently faced with. The record shows that over the past thirty years the electric power industry has expanded three times as fast as the country's productive capacity. DEPA's figures are based on grass roots estimates of the loads that must be served, and calls for the biggest expansion in electric power history. More load will be added in the next three years than has been added in the past thirty years.

To date, material requests have been cut from 10 to 30%. In the first quarter of 1952, it will be necessary to deny materials to about 300 major projects. In distributing aluminum and copper, preference is being given to transmission over distribution. It may also be necessary in the future to place restrictions on street lighting installations.

Exceptional utility performance will be required in the next few years to minimize the effects of the power supply problem on defense production.


CEDAR
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Latest and most modern facilities for
PENTA CHLOROPHENOL TREATING
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•
TWO Strategically Located Yards:
Minneapolis, Minn.
Findlay, Ohio
R. G. HALEY & CO.
SPITZER BLDG.
TOLEDO 4, OHIO

Now test from 1 to 23* Demand Meters with STATES' new versatile form "FDM" Thermal Demand Table

* Actually the number you can test is dependent only on the current capacity desired. (The Regulators have a capacity of 2.4 VA when connected single phase to 240 volts.)

If *you* want *better, quicker,* and *easier* meter testing, now is the time to consider States' *New Form "FDM" Thermal Demand Control Table and Accompanying Form "FDMR" Meter Rack Table* shown in illustration.

Notice the two Regulators on the Control Table: One for loading, one for phasing. They provide immediate control of varying conditions.

LOOK AT THE MANY IMPORTANT ADVANTAGES WITH STATES' FORM "FDM" THERMAL DEMAND TABLE—

1. All controls in easy reach of operator.
2. One, or any number of meters up to the capacity of the rack may be tested.
3. Current, potential and wattage conditions known to operator at all times, and power factor easily ascertained.
4. The phasing and loading regulators provide immediate control for varying conditions.
5. The Control Table provides necessary means for checking reference meter for full and light loads, and insulation breakdown before it is placed on the rack.
6. It is possible to use part of the rack for "heat runs" under potential while the remainder of the rack is being used for test purposes.
7. The method of loading used provides adjustable output to any number of meters on the rack—whether single phase or polyphase and at the minimum heat dissipation and without the need of loading resistances and switches.

THE STATES COMPANY
3 New Park Avenue, Hartford, Conn.

I am interested!
Please send latest information on Form "FDM" Thermal Demand Table.

Name ..... Title.....
Firm .....
City ..... Zone.... State.....

You'll do well to investigate the States' new versatile Form "FDM" Thermal Demand Table now.

THE STATES COMPANY

CATALOGS • BULLETINS

● ELECTRICAL INSTRUMENTS: A 30-page instrument booklet, recently released, explains basic factors in instrument selection and instrument types available for each major classification. Complete lines of portable, switchboard, panel, recording, and socket instruments are described and illustrated, as are instrument auxiliaries. For booklet B-4696, write Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

● INDOOR DISCONNECTS: Superseding a previous bulletin, bulletin 5101 describes high capacity indoor disconnects featuring high pressure silver to silver contacts and ball type pressure release. Switches for upright, vertical, or inverted mounting and rated 7.5 kv to 23 kv, 2000, 3000, 4000, and 5000 amp are covered. Prepared by Delta Star Electric Co, 2400 Block, Fulton St, Chicago 12, Ill.

● VAPOR DEGREASING: A 21-page question and answer handbook, this bulletin answers most questions about vapor degreasing, what it is and to what type of materials and manufacturing it can be applied. Photographs of various units and data charts are included in "Vapor Degreasing Handbook." Phillips Mfg Co, 3475 W. Touhy Ave, Chicago, Ill.

● BALL BEARINGS: Ball Bearing Catalog #7 describes the new RMB Filmoseal bearing which is sealed by capillary attraction of its lubricant. Also, an entirely new line of miniature roller bearings, over 250 types and sizes, is given with detailed information. For literature, write Landis and Gyr, Inc, 104 Fifth Ave, New York 11, N. Y.

● LADDERS: All-steel mobile ladders with adjustable push bar hangers for use with stock carts are described in a new 6-page bulletin. A safety feature of spring-mounted ball bearing castors that automatically retract when a person steps on the ladder, thus preventing rolling, is featured. Write Ballymore Co, Wayne, Pa.

● MOTORS: Bulletin 05B7150A explains types of construction and ratings of improved totally-enclosed fan-cooled motors with tube-type, air-to-air heat exchangers. Included is a rating chart of Allis-Chalmers totally-enclosed, fan-cooled motors available in squirrel cage, wound rotor, and synchronous types both for horizontal and vertical installations. Write Allis-Chalmers, Milwaukee 1, Wisc.

● COMBUSTION METER: Publication 51-553 concerns the Hays combustion meter, which operates on the Orsat principle of volumetric measurement and chemical absorption. Meter is a combustion guide to measuring the efficiency of any fuel burning operation, from such fuels as bagasse and pulverized pitch to gas and pulverized coal. Hays Corp, Michigan City, Indiana.

● WEED CONTROL: Data on methods and results in chemical brush and weed control are presented in a new "operations manual" released by DuPont. Records of brush control as experienced by telephone and power companies, railroads, gas pipe-line companies, and others are included. A copy of this illustrated manual is available by writing Grasselli Chemicals Dept., E. I. du Pont de Nemours & Co, Inc, Wilmington, Del.

● OIL CIRCUIT BREAKERS: Type JE-30 and JE-37 frame mounted OCBs are listed in catalog 548. Pacific features are: low operating current, emergency manual operation, motor-compressed-spring operating mechanism, fast and constant closing time, positive full-energy closing, etc. Available from Pacific Electric Mfg Corp, 5815 Third St, San Francisco 24, Calif.

FREE

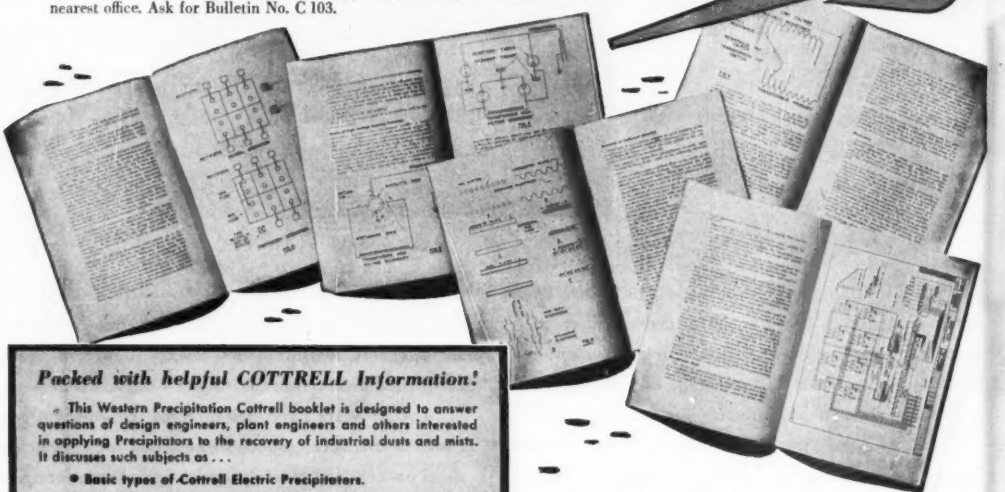
From Western Precipitation—the organization that pioneered the commercial application of Cottrell Precipitation...

IF YOU ARE ENGAGED in any phase of industry where the recovery of dusts, fumes, fly ash, mists, fogs or other suspensions from gases is a problem, you will find this booklet on the COTTRELL Electrical Precipitator helpful and informative.

Western Precipitation pioneered and installed the first commercial application of the well-known COTTRELL Electric Precipitator—Dr. Cottrell, the inventor, being a member of the company. And for more than 42 years Western Precipitation has consistently led in developing new COTTRELL advancements and techniques for recovering suspensions from gases, both wet and dry.

This 28 page booklet summarizes many of the basic facts you should know about modern COTTRELL Precipitators—the various types available, how they operate, principal types of electrode systems and rectifiers, shell constructions, etc. As long as the supply lasts, a free copy will be sent you on request to our nearest office. Ask for Bulletin No. C 103.

28 PAGES
of helpful facts to know about
COTTRELL ELECTRICAL PRECIPITATORS



Packed with helpful COTTRELL Information!

This Western Precipitation Cottrell booklet is designed to answer questions of design engineers, plant engineers and others interested in applying Precipitators to the recovery of industrial dusts and mists. It discusses such subjects as...

- **Basic types of Cottrell Electric Precipitators.**
- **Principal parts of a Cottrell Precipitator.**
- **Mechanical and Electronic Rectifiers.**
- **Various types of Collecting Electrodes (rod curtains, corrugated plates, dual plates, pocket electrodes, etc.).**
- **Removal of Collected Material.**
- **Factors in Shell Construction (steel, concrete, brick, etc.).**
- **Operating Efficiencies and the Effect of Various Factors on Performance.**

...and many other basic Cottrell facts. Write for your free copy of Bulletin C103 today while supplies are adequate!

Western Precipitation is not affiliated with any other company in the field of electrical precipitation except its wholly owned subsidiaries, International Precipitation Corporation and the Precipitation Company of Canada, Ltd. Whether you are now contemplating the installation of a Cottrell Electrical Precipitator, or may be interested in such an installation at a future date, we can and will serve you in any part of the United States or other countries.

NOW SELLING

COTTRELL Precipitators
MULTICLONE Collectors
TURBULAIRE Spray Dryers

...in all parts of the U.S.A. and foreign countries.

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CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

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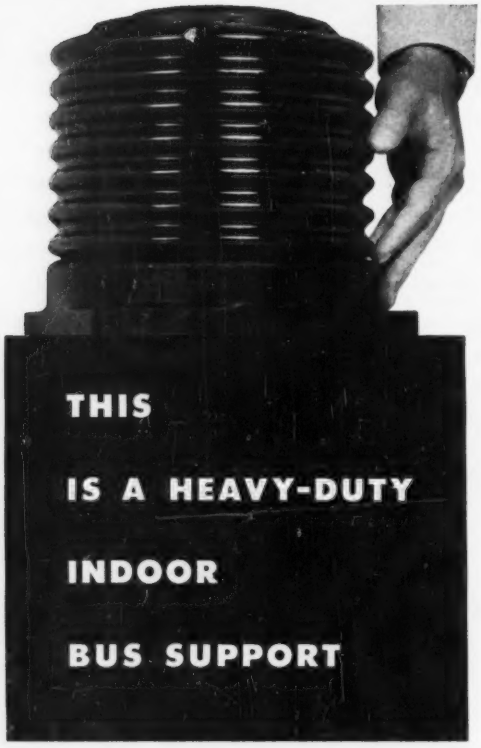
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL



This is a unit similar to thousands which have been made. Not always, however, has a manufacturer been able to undertake a production schedule of such pieces with assurance of a high percentage of yield of sound pieces, as can we at Lapp today.

And we have known of more than one instance in the past when the energizing of important power plants depended on delivery to the job of bus supports of this type on schedule.

As an insulator it consists of a heavy malleable iron base, and a large malleable iron insert cemented into the top of the porcelain. The porcelain itself is H-shape in section, with massive walls and integral diaphragm.

Such thick sections are difficult of drying and firing, because of shrinkage—about 30% from plastic state to fired piece. Throughout manufacture, this shrinkage is insistent, and—except under critically controlled production techniques—unpredictable.

For 35 years Lapp has directed its attention and effort to the development of methods for producing *sound* porcelain to meet a varied range of requirements. The result is a quality of porcelain that provides an extra margin of operating security and extra value. When you buy electrical equipment—or insulators—look for the name LAPP on the porcelain. You'll be money ahead in the fact that although *you can buy cheaper porcelain . . . you can't buy better porcelain . . . than Lapp.* Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

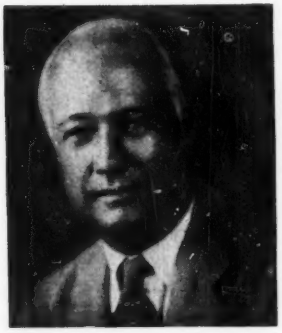
NEWS ABOUT PEOPLE

Busby, 2 Others Elevated by South Carolina E&G

T. A. Busby, operating vice president of South Carolina Electric & Gas Co, has assumed the duties of vice president and assistant to the president. F. R. McMeekin has been appointed operating manager with supervision over all operations of the electric, gas, and transportation departments.

The company also named Bonnie Huff assistant division manager of its Charleston Division.

After serving several years in the meter department of the Alabama



T. A. BUSBY

Power Co, Busby joined the former South Carolina Power Co at Charleston in 1928 and was in charge of electric meter operations. In 1931 he became associated with the Commonwealth & Southern Corp in a similar position with headquarters in Birmingham. Three years later he returned to the Charleston company as meter engineer, later becoming assistant to the general manager of the company. In 1945 he was elected vice president in charge of operations. Following the merger of the South Carolina Power utility with South Carolina E&G in 1950, Busby was transferred to Columbia as operating vice president.

McMeekin, manager of production and transmission, started his career with Westinghouse Electric Manufacturing Co at Pittsburgh, Pa. Later he joined a predecessor company of South Carolina E&G as an electrical dispatcher. In 1926 he was made chief dispatcher of the Columbia division, later becoming chief dispatcher for the company. He was appointed superintendent of transmission in 1935, electrical engineer in 1944, superintendent of power for the Columbia utility in 1947, and manager of production and transmission for the combined utilities in 1950.

F. R. McMEEKIN

Huff, assistant secretary of the combined companies since 1950, started with South Carolina Power in 1928 as manager of the land and insurance department, later serving as assistant secretary from 1932 to 1942, and secretary until the merger with South Carolina E&G.

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J. C. Hydrick has been appointed works manager of Delta-Star Electric Co. He will be responsible for all plant functions of the company and will supervise the plant expansion program. He has been chief engineer of Quaker Rubber Corp, also a H. K. Porter Co subsidiary.

John E. Logan, manager of system operations for Jersey Central Power & Light Co, has been made assistant chief engineer. He joined the company in 1934. His headquarters will be at the utility's Asbury Park offices.

Ralph Teed Is Named a VP by Arkansas P&L

Ralph H. Teed, manager of Arkansas Power & Light Co's western division at Hot Springs, has been elected a vice president of the utility, effective Jan. 1.

Two other personnel changes have been announced by Arkansas P&L.

Ish C. Beam, local manager at Hot Springs since 1946, has been promoted to division manager to succeed Teed.

J. Watt Smith, office manager of the western division at Hot Springs since 1947, has been made local manager there, replacing Beam.

After serving with utility firms in New York and Colorado, Teed went

R. H. TEED

to Hot Springs in 1928 as general superintendent of the Citizens Electric Co, Hot Springs Water Co, Consumers Gas Co, and the Hot Springs Street Railway Co. Ten years later he was elected president of this group of utilities. When Arkansas P&L took over the electric properties at Hot Springs, Teed became the local manager. He became manager of the western division in 1946.

Beam, the new manager of the western division, began his career as an office boy with the Hot Springs utilities in 1922. He served successively as clerk, purchasing agent, chief clerk of operations, and assistant manager, and manager.

Widely used on

- Insulator Pins
- Crossarm bolts and braces
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- Eliminate checking and re-tightening
- Eliminate radio interference due to loose hardware

Every bolt-and-nut assembly locked with PALNUT Lock Nuts stays tight, despite weather, wind, stress and vibration. PALNUTS tightened on top of the regular nuts, prevent loosening and falling off. Very low in cost—easily, speedily applied—require little space—may be used on new or existing assemblies. Heavily galvanized by hot dip process to meet A.S.T.M. Specifications. Stocked by all leading pole line hardware manufacturers.

Also used on steel towers, transformers, voltage regulators, disconnects, connectors, bus fittings, etc.

Send details of your needs for PALNUT samples. Write for folder on utility applications.

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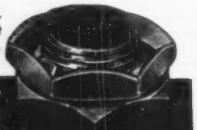

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Reg. U.S. Pat. Off.

Smith, the new Hot Springs local manager, joined Arkansas P&L in 1922 as a meter reader and billing clerk at El Dorado. There he was promoted successively to bookkeeper, office manager, and then chief clerk of the southwestern division. After a short period in the treasury department of the company's general offices at Pine Bluff, he went to Hot Springs as district auditor in 1943.

•

FPC's 1st Woman Lawyer Retires; Served 17 Years

Miss Nelle I. Ingels, first woman lawyer to join the staff of the Federal Power Commission, retired recently after more than 30 years in government service—17 of them with FPC.

A native of Greenville, Ill., Miss Ingels came to Washington in 1918 to join the War Department. She went to FPC in 1934, and has been a member of the Bureau of Law since that time. Miss Ingels plans to continue the practice of law in a private capacity.

•

William M. Freudigman has been named assistant sales manager in charge of promotion for Narragansett Electric Co, Providence, R. I. In other appointments **Charles E. Rounds** was made assistant sales manager in charge of major appliances at Providence and **Eugene F. Murphy, Jr,** Providence sales supervisor. **Miles E. Baldwin** has been placed in charge of contacts with contractors and builders and **Arthur L. Gledhill** has been named sales supervisor for Narragansett's Westerly division. Freudigman joined the utility in 1936 and has served as advertising manager and assistant merchandise sales manager.

William C. Stratton has rejoined Ebasco Services, Inc, and has been assigned to the Washington office. During World War II he was chief of the steel section of the Office of War Utilities. He then joined Ebasco but left later.

David J. Guy has retired as manager of the Natural Resources Department of the U. S. Chamber of Commerce where he was a writer on power and flood control. He formerly was employed by Stone & Webster Engineering Co and the Federal Power Commission.

New Hampshire Electric Promotes Forrest Eaton

Forrest M. Eaton has been elected general manager of the New Hampshire Electric Co, Portsmouth succeeding R. C. L. Greer, who has resigned. He has been acting general manager since last spring when Greer was obliged to give up active duties.

F. M. EATON

Eaton joined Cape & Vineyard Electric Co, Hyannis, Mass., in 1926 and in 1937 was transferred to the New Hampshire company as assistant general manager. Both utilities are subsidiaries of the New England Gas & Electric Association.

Greer started with the Portsmouth utility in 1925 and was made general manager in 1930 and later vice president and a director. He will continue to serve in the latter two offices.

•

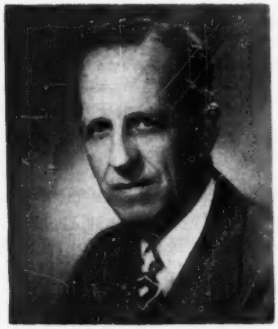
Paul J. Moore has been appointed educational supervisor for West Penn Power Co succeeding I. J. Shepherd who has retired after 28 years with the utility. The company placed all educational and training activities of the personnel department under the direction of training supervisor **J. K. Walter.** Moore has been personnel research administrator at West Penn since 1949. He joined the company in 1927. Shepherd started with West Penn in 1924 as testing engineer and was named education supervisor in 1936.

Robert C. Sprague, founder and president of Sprague Electric Co, North Adams, Mass., has been elected president of the Associated Industries of Massachusetts.

Wefeler Is Elected a VP by W. N. Matthews

The W. N. Matthews Corp, St. Louis, Mo., has elected Herbert H. Wefeler vice president in charge of sales. He has been sales manager of the firm since 1950.

Wefeler joined the company in 1925 as a draftsman. He began to



H. H. WEFELER

work on design of new products and improvements of old ones and later went into sales engineering.

For a number of years he had charge of sales in the St. Louis district. Then he was made assistant sales manager under the sales vice president.

S. Vernon Travis has been appointed manager of the newly established sales standards section of General Electric Co's apparatus sales division. **Edward A. Green** has been named manager of product planning of the company's small and medium motor department. **Neil Currie, Jr,** general consultant for the manufacturing services division, has retired after being with GE for 43 years.

Robert M. Oliver has been appointed merchandising counselor for the Westinghouse Electric Appliance Division. He was with Westinghouse Appliance from 1936 to 1940 in various advertising and sales posts. He then joined Proctor Electric Co as a vice president and director, leaving in 1949 to go to Landers, Frary & Clark Co as general merchandising manager.

Hawthorne Deming, manager of the lamp and lighting sales division of International General Electric Co, has been named assistant to the vice president in charge of sales.

Expansible Firesafety

from a single LOW PRESSURE CARBON DIOXIDE storage tank

When expanding your plant, you can't afford to wait for additional fire protection ... you need the proper amount at once. However today, material priority regulations slow you up considerably ... these delays hold back vital production and resulting revenue. Install a C-O-TWO® Low Pressure Carbon Dioxide Type Fire Extinguishing System in your plant now and new construction to come will be firesafe from the start.

With a C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing System, simple piping, running from one centrally located storage tank, instantly transports clean, non-damaging, non-conducting carbon dioxide anywhere in the plant area ... to flammable liquids, electrical equipment, storage spaces, manufacturing processes and record vaults. Fire at any protected location is extinguished in seconds with an absolute minimum of expense and interruption.

Future plant expansion is quickly and economically provided for by initially installing an oversized low pressure carbon dioxide storage tank... capacities range from one to fifty tons. Discharge facilities can be either manual mechanical, manual electric, automatic mechanical, automatic electric or a combination of these ... all are easily extensible at a later date.

Don't take chances with future delayed installations; secure the benefits of highly efficient fire protection engineering today ... our extensive experience over the years is at your disposal without obligation. Get the facts now!

C-O-TWO

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Sales and Service in the Principal Cities of United States and Canada

Affiliated with Pyrene Manufacturing Company

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

MANUFACTURERS and MARKETS

TRANSACTION COMPLETED—Gustav A. Herzberg (left), a director and one of the original founders of Jewel Products Corp, Bloomfield, N. J., signs the papers which make the Jewel firm a wholly owned subsidiary of Duro-Test Corp, North Bergen, N. J., while Walter H. Simson (right), president of Duro-Test, looks on

Jewel Products Becomes Subsidiary of Duro-Test

Duro-Test Corp, North Bergen, N. J., incandescent and fluorescent light bulb manufacturer, has purchased complete ownership of Jewel Products Corp, Bloomfield, N. J. Jewel, which also manufactures incandescent light bulbs, will be operated by Duro-Test as a wholly owned subsidiary under its same name.

The purchase price was not disclosed, but it was officially stated that the transaction included all of the company's plant, buildings, machinery, inventory, patents, and other assets. The acquisition provides Duro-Test with an electronic plant, including 18 complete incandescent manufacturing units that can produce 12 million incandescent lamps annually. Walter H. Simson, president of Duro-Test, said the acquisition makes his firm one of the Big Four in the incandescent lamp industry.

Gustav Herzberg, co-founder of Jewel, which was established more than 30 years ago, has been made president of Jewel.

•

McGraw Electric Buys Jeffrey-DeWitt Insulator

McGraw Electric Co, Chicago, has announced the acquisition of the Jeffrey-DeWitt Insulator Corp, Kenova, W. Va., from W. L. Stinson, president of the electrical porcelain firm. Line Material Co, Milwaukee, Wis., a division of McGraw Electric, will operate the new facility, which will presently remain under the management of Stinson.

W. D. Kyle, Jr, president of Line Material, has revealed that Jeffrey-DeWitt has a considerable backlog of orders. These will be filled in addition to providing L-M's ten plants with substantial quantities of electrical porcelain for use in the transmission and distribution equipment which they manufacture.

Jeffrey-DeWitt was founded in 1918 by the two men whose names it still bears. In 1922 it became a subsidiary of Champion Spark Plug Co, from whom it was purchased in 1941 by Stinson. The plant occupies 200,000 sq ft and employs 325 persons.

Kyle also announced the appointment of W. V. Swan as manager of porcelain sales. Swan will make his headquarters at Kenova.

•

Two Aluminum Plants to Receive GE Equipment

General Electric Co will supply equipment, costing more than $20 million, for installation in two new aluminum plants.

Kaiser Aluminum & Chemical Corp has ordered nearly $13 million of the equipment for a new four-potline reduction plant at Chalmette, La. Reynolds Metal Co has also ordered equipment, worth about $8 million, for its two-potline installation now under construction near Corpus Christi, Tex.

Equipment ordered for Kaiser's Chalmette plant will be used in facilities designed to boost that firm's production by nearly 200 million lb a year, about half of the plant's eventual output. A total of 80 General Electric d-c generators, each developing 1,200 kw and driven by natural gas engines, will provide power for two of the four Chalmette potlines. The remaining two lines now underway will be supplied by five 20,000-kw steam turbines. Two 10,000-kw steam turbines will provide power for plant auxiliaries. Other GE equipment includes switchgear, control, and some 40 transformers ranging from 500 to 60,000 kva.

GE equipment scheduled for the Reynolds company's new Corpus Christi plant includes 69 dc generators, 38 rated at 2,000 kw and 31 rated at

Metal Prices
Dec. 26, 1951

COPPER, Conn., V., lb	$ .24½
LEAD, N. Y., lb	.19
ZINC, prime Western, E. St. Louis, lb	.19½
TIN, Straits, qual. N. Y., lb	1.03
ALUMINUM, ingot, base price	.19
NICKEL, base price	.56½
STEEL, billets, Pitts., ton	56.00
STEEL, scrap, No. 1 heavy, Pitts., ton	45.00

2,500 kw. The new plant, which is designed for a capacity of 150 million lb a year, will also receive nine ac, 3,125-kva generators for general plant power, as well as switchgear, control, thirteen 1,500-kva load center unit substations, and ten other unit substations ranging from 500 to 1,000 kva. This installation is part of an expansion program aimed at increasing Reynold's aluminum production by 200 million lb a year.

Operations at Kaiser's Chalmette plant have started. The Reynolds plant is expected to be in operation by the end of 1951.

•

1st Aluminum Shipment Leaves Chalmette Plant

First shipment of aluminum pig from Kaiser Aluminum & Chemical Corp's Chalmette, La., plant moved last week to the company's extrusion plant at Halethorpe, Md., where it will be converted into aircraft.

In less than a month, the same metal is expected to be on the assembly line of an aircraft company. The Chalmette plant, first post-war aluminum expansion to get into production, is to be the largest producer of primary aluminum in the nation. The Chalmette plant was opened Dec. 11 by Charles E. Wilson, chief of the Mobilization Program, less than ten months after ground was broken.

•

Government Prints List of Royalty-Free Patents

The government patents board has compiled a list of more than 2,000 government-owned patents which are available without charge to American businessmen under nonexclusive, royalty-free license.

Patents listed cover a wide range of products and processes developed in federal research programs. Among them are patents relating to wiring devices and supplies, power and distribution transformers, insulated wire and cable, switchgear, switchboard apparatus and industrial controls.

The patents are described in "Government Owned Inventions for Free Use." It can be secured from the U. S. Government Printing Office, Washington 25, D. C. or any field office of the Department of Commerce for $1.

Simple, Trouble-Free Aerial Service Unit—by EAGLE

LADDER EXTENDED

LADDER CLOSED

THIS combination ladder and all-purpose service body unit can be mounted on 1/2 and 3/4 and 1 ton trucks — a mobile, aerial service unit with a wide range of usefulness.

Extension ladder available in 24 ft., 28 ft., 32 ft. and 36 ft. lengths. Provides aerial equipment with no mechanical devices subject to breakdown or requiring maintenance attention. One-man operated — ladder easily extended or lowered and closed. Ladder is mounted clear of body floor. Service body offers safe, weatherproof storage compartments for tools and materials — available in 74 inch, 84 inch, and 94 inch lengths. Send for complete information on the Eagle Aerial Service Unit.

EAGLE

EAGLE MANUFACTURING CO.
Division of
The Four Wheel Drive Auto Co.
APPLETON, WISCONSIN

Utility Bodies • Trailers • Pole Derricks
Tools and Accessories
Eagle equipment is engineered by and for utility men expressly for their needs

Distributed by GRAYBAR

Send today for the complete catalog of Eagle Line Construction and Maintenance Equipment — a useful reference book.

Double Barrel Advertising

Advertising men agree — to do a complete advertising job you need the double effect of both Display Advertising and Direct Mail.

Display Advertising keeps your name before the public and builds prestige.

Direct Mail supplements your Display Advertising. It pin-points your message right to the executive you want to reach—the person who buys or influences the purchases.

More and more companies are constantly increasing their use of Direct Mail because it does a job that no other form of advertising will do.

McGraw-Hill has a special Direct Mail Service that permits the use of McGraw-Hill lists for mailings. Our names give complete coverage in all the industries served by McGraw-Hill publications — gives your message the undivided personal attention of the top-notch executives in the industrial firms. They put you in direct touch with the men who make policy decisions.

In view of present day difficulties in maintaining your own mailing lists, our efficient personalized service is particularly important in securing the comprehensive market coverage you need and want.

Ask for more detailed information today. You'll be surprised at the low over-all cost and the tested effectiveness of these hand-picked selections.

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330 West 42nd Street, New York 18, N. Y.

MEMCO (SINCE 1915)

Headquarters for Splicing Sleeves

BUS FITTINGS

ELECTRIC POWER CONNECTORS

OUTDOOR SUBSTATIONS

MEMCO ENGR. & MFG. CO., INC.
COMMACK, L. I., N. Y.

All the strength and durability inherent in steel are combined—with definite economies— in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

NEW ELECTRICAL CONSTRUCTION

A weekly selection of U. S. electrical construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is indicated or implied

UTILITIES

Proposed Construction

Arizona—Mohave Electric Co-operative, Kingman, 39 mi. rural distr. lines, Kingman Co. $107,000.

Arizona-Nevada—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.o.b. cars Prescott, Ariz., control board for Prescott Sub-station, Davis Dam Proj. Spec. DS 3609. L. N. McClellan, ch. engr.

California—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver Colo., furnishing, del. f.o.b. cars Roseville, or f.o.b. cars shipping point, auto-transformers, lighting arresters, etc. for Folsom Power Plant Switchyard, Central Valley Proj., Spec. DS 3607. L. N. McClellan, ch. engr.

Calif., San Diego—Bd. Supervs. San Diego Co. Civic Center, electric power feed line and stand-by electric plant $400,000. Plans deposit $25. W. A. Barney, co. engr.

Colorado—Bureau Reclamation, Dpt. Interior, Fort Collins, installation of equip., appurtenances, structures, transmission line for Beaver Creek substation, Colorado-Big Thompson Proj., ¼ of mile east of Brush, Spec. DC 3610.

Fla., Jacksonville—City, City Hall, six 500 kva three phase power units of the vault type for network service, Adv 2-7049. Approx. $60,000.

Fla., Jacksonville—City, City Hall, furnishing, installing intake basin hoist, elec. equipment and maintenance platform at Southside Generating Plant, Plans deposit $3 each. Reynolds, Smith & Hills, 227 Park St., engrs.

Idaho—U. S. Eng., 4735 E. Marginal Way, Seattle 4, Wash., three 13,500 kva 3-phase power transformers for Albeni Falls Dam, Inv. 52-22.

Illinois—McDonough Power Co-operative, Macomb, addnl. rural distr. lines and sys. imprvs. McDonough Co. and vicinity, $168,000.

Kansas—Sugar Valley Electric Co-operative, Mound City, 98.41 mi. rural distr. lines, 25.01 mi. line changes, Linn and Miami Counties. $125,000. Frank Horton & Co., Lamar, Mo., consult. engrs.

Louisiana—Claiborne Electric Co-operative, Homer, 136 mi. rural distr. lines, sys. imprvs., Claiborne Co. $910,000.

Mass., Leominster—City, Water Works Office, Municipal Bldg., deep well, pump turbine and equip., Howard E. Bailey, 6 Beacon St., Boston, engr.

Mass., Nantucket—Dpt. Commerce, Federal Bldg., New York International Airport, Jamiaca, N. Y., 12x16 ft. power shed installations, related constr. and electric work, etc., No. 152-884B1.

Minnesota—Rural Co-operative Power Assn., Elk River, 18.5 mi. 69 kv. electric transmission line, Pine Co., $90,000. Plans deposit $10. United Engineering Service, 919 W. Lake St., Minneapolis, consult. engrs.

Minn., Wheaton—Village, J. E. Pearson, clk., municipal power plant, $250,000. R. D. Thomas & Assoc., 400 Metropolitan Life Bldg., Minneapolis, consult. engrs.

Miss., Yazoo City—City, voted $1,700,000 bonds, power plant imprvs.

Missouri—Northwest Electric Power Co-operative, Inc., Cameron, 600 mi. 69 kv power transmission lines, Henningson, Durham & Richardson, Inc., Standard Oil Bldg., Omaha, Neb., consult. engr.; 200 mi. 154 kv. electric power lines, Frank Horton & Co., Lamar, consult. engrs.

Missouri—Northwest Electric Power Co-operative, Cameron, 75 mi. rural distr. lines, Andrew DeKalk, Gentry, Daviess, Harrison and Mercer Counties. $400,000. Henningson, Durham & Richardson, Standard Oil Bldg., Omaha, Neb., engrs.

Mo., Missouri City—Northwest Electric Power Co-operative, Cameron, superstructure power plant. Lutz & May, Finance Bldg., Kansas City, Mo., engrs.

Nebraska—Elkhorn Rural Public Power Dist., Battle Creek, rural distr. lines, sys. imprvs., Madison Co. $420,000. H. S. Nixon Eng. Co., W. O. W. Bldg., Omaha, consult. engr.

Neb., Bellevue—City, $450,000 bond election Dec. 27, municipal power plant and distr. sys. Kirkham, Michaels & Assoc., 1504 Dodge St., Omaha, consult. engrs.

N. Y., Buffalo—U. E. Eng., 80 Lafayette St., New York, Zone 13, modernization wind tunnel at Cornell Aero Laboratory, $1,500,000. Cornell Aeronautical Laboratory, 4455 Genesee St., Cheektowaga, Buffalo, N. Y., consult engr.

N. Y., Rome—U. S. Eng., 80 Lafayette St., New York, Zone 13, electronic test facilities at Griffis Air Force Base. $818,000. Alexander D. Crossett, 27 William St., New York, Zone 5, engr.

Pa., Marietta—U. S. Eng., 24 St. and Maryland Ave., P. O. Box 1715, Baltimore 3, Md., installing electrical system, Warehouse No. 7, Sect. 4. Marietta Transportation Corps Depot. Serial No. ENG 18-020-52-17.

Va., Fort Eustis—U. S. Eng., foot of Front St., Norfolk, expansion and rehabilitation electrical distr. sys., distr. pole lines, feeder lines, master unit sub-station, switching stations, install power transformer, ENG 44-110-52-12B.

Low Bidders & Contracts Awarded

Mich., Flint—Darin & Armstrong, Inc., 2041 Fenkel St., Detroit, Mich. CA $11,000,000. 900x1,120 ft. Wright Engine plant incl. cyclone and 3,500 hp Wright turbo, R 3350-26W and R 3350-30W., Chevrolet Motor Div. General Motors Corp., T. H. Keating, gen. mgr., 3044 W. Grand Blvd., Detroit 2, Mich. Argonaut Realty Div. General Motors Corp., General Motors Bldg., Detroit, Mich., engr.

Missouri—Gable Electric Service, 6713 Snider Plaza, Dallas, Tex. LB $556,479. 161/69 kv 50,000 kva power sub-station together with connection transmission line in Greene Co., 3 mi. southwest of Springfield. Southwestern Power Admin., Petroleum Bldg., Tulsa, Okla. Bids Nov. 20.

Nebraska—General Electric Co., 650 17th St., Denver, Colo., LB $106,775. one 27,000/36,000 kva. transformer with three 115,000 volt and three 13,800 volt lightning arresters and one current transformer for Gering Sub-station, Spec. DS-3567, Missouri River Basin Proj., Transmission Div. Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo. Bids Nov. 29.

R. I., Providence—United Engineers & Constructors, Inc., engr., 1401 Arch St., Phila., CA. Approx. $500,000. design and construct electric generating plant addns., alterations for Narragansett Electric Co., 51 Westminster St., Providence, R. I.

Tex., Fort Worth—City, City Hall, Fort Worth, Tex., Own Forces. $90,000. relocation of some power lines, International Airport. Wyatt C. Hedrick, 1005 First Natl Bank Bldg., Fort Worth, Tex., engrs. CD 11/30.

Tex., Rockdale—Texas Power & Light Co., Interurban Bldg., Dallas, Tex., Owner Builds. Approx. $750,000. electric generating sub-station, at Sandow, 8 mi. southwest of here.

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Mich., Ann Arbor—State, A. N. Langius, dir. State Bldg. Dpt., Lansing, brick, steel, concrete state prison, Medium Security Institution for Young Prisoners. $5,000,000.

O., Lima—Standard Oil Co., Midland Bldg., Cleveland, catalytic reforming unit, $8,500,000; crude coking unit addn. $2,400,000.

Tex., Beaumont—E. I. du Pont de Nemours & Co., 2219 McKinney St., plant for plastics and chemicals, on 700 acre site between Texas Gulf Sulphur Plant and Neches River. $100,000,000.

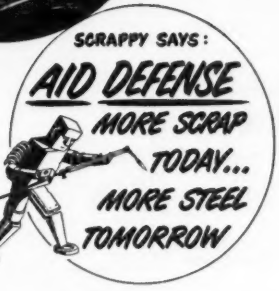
B. C., Vancouver—Elks Falls Co., Ltd., c/o Pacific Mills Ltd., foot of Campbell St. and Canadian Wester Co., 355 Burrad St., pulp mill, Approx. $21,000,000.

Now another

OF OUR PRECIOUS NATIONAL RESOURCES

IS WASTING AWAY

in your plant



It's iron and steel scrap.

Are you surprised to learn that scrap piles furnish just as much steel mill melting stock as iron mines do?

It's a fact. 50% of the melt is iron and steel scrap . . . and some of this scrap is wasting away in *your* plant.

This scrap of yours is needed to help maintain steel production so there will be enough steel for both military and civilian needs.

It's up to you to get idle iron and steel into the mills. Channel it through your local scrap dealer.

Don't delay. The mills need 3000 carloads of scrap a day—every pound counts in this emergency!

NON-FERROUS SCRAP IS NEEDED, TOO!

This advertisement is a contribution, in the national interest, by

McGRAW-HILL PUBLISHING COMPANY, INC.

330 WEST 42nd STREET, NEW YORK 18, N. Y.

SEARCHLIGHT SECTION

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UNDISPLAYED —RATES— **DISPLAYED**

$1.10 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

POSITION WANTED and INDIVIDUAL SELLING OPPORTUNITY undisplayed advertising rate is one-half of above rate, payable in advance.

Box Numbers—Care of publication count as one line. *Discount of 10%* if full payment is made in advance for 4 consecutive insertions.

EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style. *Individual Spaces* with border rules for prominent display of advertisements.

The advertising rate is $11.25 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS received in the New York City office by Jan. 4th will appear in the Jan. 14th issue subject to limitations of space available

Corrosion Engineers

Corrosion Engineers with minimum of three or four years experience in corrosion investigations and design of cathodic protection on pipe lines and lead cables in country and city networks. Must be graduate electrical engineer (or equivalent). Work involves extensive travel, with headquarters in New York City. Only applicants with above qualifications will be considered. Give full details of education and experience, and references, in application.

P-2844, Electrical World
330 W. 42 St., New York 18, N. Y.

EXPERIENCED

ELECTRICAL DESIGN ENGINEER

for permanent position. College Graduate, with two to four years experience in an industrial plant desired. Applicants please state age, education, previous experience and salary.

AMERICAN ENKA CORPORATION
ENKA, (Near Asheville) NORTH CAROLINA

GENERAL MANAGER

OPERATING UTILITY COMPANY

Rapidly expanding highly rated western operating electric utility serving 120,000 customers has very promising opening for general manager between 38 and 45 with background of broad experience and accomplishment in principal field and general departments. Annual salary $15,000 to $20,000. Submit complete record of education and experience. All replies confidential.

P-2696, Electrical World
68 Post St., San Francisco 4, Calif.

LIGHTING ENGINEER

Experienced lighting engineer, capable design, selection and application of lighting for generating plants, electric substations, industrial plants and office buildings. Applicant should be qualified or interested in training for handling of all technical problems related to lighting engineering. Location, New York City. Please furnish complete information including age, education and experience record.

P-2553, Electrical World
330 W. 42 St., New York 18, N. Y.

UPPER INCOME EXECUTIVES

$5,000-$50,000, seeking positions in California or anywhere in the USA write for outline of highly personalized confidential service. No obligation—your identity protected.

ALBERT L. WALTERS ASSOCIATES
Los Angeles-San Francisco, Executive Career Specialists serving Western Industry. Est. 1944.
Mail to 1210 de Young Bldg., San Francisco 4

WANTED: Experienced Power Station Engineer.
POSITION: Assistant to Manager of Power Production with administrative responsibility of operating central stations totaling approximately 800,000 kw.
LOCATION: Pennsylvania.
ADVANCEMENT: Excellent for growth on job and promotion in near future.
EXPERIENCE: 10 years minimum, with at least 5 years in operation, maintenance or efficiency work in large modern steam-electric central station. Construction and design experience will be considered.
EDUCATION: B.S. degree in Mechanical (preferred) or Electrical Engineering from an accredited engineering college.
AGE: 30-45.
Salary commensurate with qualifications
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UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-3612) will be received by the Bureau of Reclamation, Denver, Colorado, until January 29, 1952, and then publicly opened for furnishing control boards with carrier-current equipment and supervisory control and telemetering equipment for local and supervisory control and telemetering for Pole Hill Power Plant, Colorado-Big Thompson Project, Colorado. Delivery is desired within 360 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver, Colorado.

UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (invitation No. DS-3607) will be received by the Bureau of Reclamation, Denver, Colorado, until January 17, 1952, and then publicly opened for furnishing one 80,000-kva, 115- to 230-Grd. Y-kv, 3-phase, 60-cycle, oil immersed, class FOA, outdoor autotransformer with 4,160 delta-volt tertiary winding for Folsom Power Plant switchyard, Central Valley Project, California. Delivery is desired within 730 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver, Colorado.

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TRANSFORMERS

Qu.	KVA	MFR.	VOLTAGE
3	3333	West.	132000—7620/13200 Y
4	2000	West.	69000—13800
4	2500	West.	44000—11000
3	1500	Wag.	44000—6900 NEW
3	200	Mol.	44000/22000—440/220
3	100	G. E.	44000—2300
3	75	West.	44000—7200/12470 Y
3	8333	West.	43800—13900
1	18750	A.B.B.	34840—11000, 3 ph.
6	1500	Pitts.	33000—2400
3	200	West.	33000—2400
4	150	G. E.	33000—7200/12470 Y
3	100	A. C.	33000—7200/12470 Y
3	75	Mol.	33000—2300 6900
3	75	Wag.	33000—7200/12470 Y
3	50	G. E.	33000—2300 4000 Y
3	50	Kuhl.	33000—7200/12470 Y
4	450	A. C.	25110/44000—13280/23000
3	50	West.	22000—2300
2	667	Pitts.	13200—2200
3	200	Mol.	11000—2300
3	150	Mol.	7620/13200 Y—120/240
3	667	Kuhl.	7200/12470 Y—2400
3	100	West.	7200/12470 Y—2400
4	50	G. E.	7200/12470 Y—2300
3	150	Wag.	6900—2300
1	100	G. E.	2300—575, 3 ph.
1	37½	G. E.	230/460—115/230

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1—140 KVA G. E. 200 A. 4000 V. 3 ph.
2— 48 KVA West. 200/400 A. 2300 V
6— 36 KVA G. E. 150 A. 2400 V.
2— 36 KVA G. E. 75/150 A. 4800 V.

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1—600 A. 73 KV G. E. FHKO-236— 500 MVA
1—400 A. 37 KV G. E. FHKO-136— 350 MVA
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3—333 KVA G-E 44000—6600
3—250 KVA W-H 13800—2300
3—200 KVA G-E 13200—120/240
3—250 KVA Kuhl 6600—575
3—150 KVA G-E 44000/33000—2400/500
3—150 KVA Pitts 22000—575
3—150 KVA G-E 19050/33000Y—2540/2300
3—150 KVA A-Ch 13800—2300
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2—	750	G.E.	Condensing — 425 lbs. 750 TT I.S.P. 440v. 3 ph. 60 cy.—Built 1944
1—	500	Moore	Non-condensing, 150/200 lbs ISP 5/35 lbs. G.B.P. 3 60 480 volts Direct Connected Exciter
1—	400	Westg.	Non-condensing — 125/150 lbs. I.S.P. 5/10 lbs. B.P.—240/480 v. 3 ph. 60 cy.
1—	300	G.E.	Non-condensing 150/175 I.S.P. 5/10 B.P.— 480 v. 3 ph. 60 cy.

SYNCHRONOUS CONDENSERS

KVA	Make	Type	Volts	Speed
1—8000	Whse.		2400/4150	600

MOTOR GENERATOR SETS

3 ph. 60 cy.

Qu	KW	Make	Speed	DC Volts	AC Volts
2—	2000	G.E.	500	600 25 cy.	11000
1—	1500	G.E.	720	600	13200
1—	1500	G.E.	360	275	2300/4400
1—	1000	G.E.	900	260	4100/6900
2—	500	Whse.	900	250	6900/13200
1—	500	Whse.	1200	125/250	2300
1—	500	Whse.	900	250	440
1—	500	G.E.	720	125	2300
1—	400	G.E.	720	250	440/2300
1—	250	G.E.	900	125	4150
1—	240	G.E.	1200	250	2300
1—	150	G.E.	1200	275	2300
1—	150	Whse.	1200	275	2300
1—	140	Cr. Wh.	690	125/250	2300

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KVA	Make	Type	Ph	Voltages
1—4000	G.E.	HT	3	22000x2300
3—1500	Pitts.	OISC	3	22000/2300
3—1250	G.E.	HVDDJ	1	6600x550
3— 500	A.C.	OISC	1	13200/2300
6— 300	G.E.	HT	3	2400x240/480

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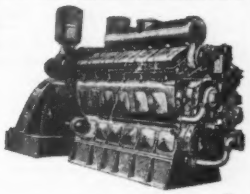

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KVA	Make	Model	HP	RPM	KVA	Make	Model	HP	RPM
1875	Fairbanks Morse	32P16	2000	300	375	Enterprise	12SG-6	450	480
1420	Fairbanks Mors	38D8⅛	1600	720	330	Superior	KNA	396	514
1250	General Motors	16-278A	1600	720	312	General Motors	8-268A	450	1200
937.5	General Motors	12-567	1080	720	312	Clark	MD-4	375	327
625	Alco	6-12½x18T	750	600	125	Ingersoll Rand	S	225	514
425	Baldwin	VO-6	510	450	187	General Motors	3-268A	150	1200
400	Buckeye	80	480	600	75	General Motors	6043C	90	1200

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3—1500 KVA Pittsburgh, 1 Ph., 22,000-2200V
1—1500 KVA G.E., 3 Ph., 4150V, 2300V Pyranol
2—400 KVA Pittsburgh, 1 Ph., 2400/4800-240/480 Scott-Taps
3—400 KVA G.E., 1 Ph., 6900V 2300V Sec.
1—200 KVA G.E., 3 Ph., 2400-220 Sec.
2— 50 KVA Whse., 1 Ph., 2400V 120/240 Inertean
6— 50 KVA G.E., 1 Ph., 13,450V, 120/240 Sec.

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1— 176 KVA West., 1 Ph., 220V, Motor 3 Ph., 440V.
1— 150 KW G.E., 125/250V, 1200 RPM, 2300 Syn.
1— 75 KW., 250V, 1200 RPM., 2400V, Syn.

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LETTERS TO THE EDITOR

Where Can I Buy It?

To the Editor:

I have just read the article in Electrical World "Locating Sources of TV Interference" (Nov. 19, pp 99-104) and I find it quite interesting as well as educational. We are in the electrical distribution business and we get blamed for most of this trouble being on our lines. I'm quite sure this is not true. However, we are quite willing to help clear up any interference that might be causing our customers this trouble with their television receivers.

Could you furnish us with the names of manufacturers who make this equipment for locating TV interference and also cost of such equipment?

D. K. Marshall
Supt. of Electrical Distribution
City of Seward
Seward, Nebraska

• Companies that make this equipment include P. R. Mallory & Co, Inc, Indianapolis 6, Ind.; A. B. DuMont Laboratories, Inc, Clifton, N. J.; National Company, Inc, Malden, Mass.; Gonset Company, Burbank Calif.; Transvision, Inc, New Rochelle, N. Y.; and Hallicrafters Company, Chicago 24, Ill.

Prize Awards Again

To the Editor:

Your editorial "Prize Awards Again" December 3, 1951, p 88, does not quite cover all the reasons for the low number of competitors for prize awards. I believe two other factors are probably more important than those mentioned in your editorial, i.e., laziness and fear of losing.

The problem of finding sufficient time to prepare a paper or an exhibit is very real for those who must carry on their regular duties without sufficient technical help. The other reason is the more or less selfish problem of determining who is to receive the acknowledgment. When the staff accumulates and prepares the information for the paper, should the individuals who do most of the work or the department head receive the honor? It is not feasible to have listed as authors all of the persons who are involved in the preparation of such a paper.

H. P. Bruncke
Supt. of Protection and
Electrical Maintenance
Northern States Power Co
Minneapolis 2, Minn.

Procurement is Problem

To the Editor:

I am enclosing the completed copy of your questionnaire providing data for your 48th Annual Survey of Electric Utility Construction and Expenditures.

Procurement of vital materials, such as steel, copper, and aluminum, is at the moment one of our company's greatest problems in our construction program. Electrical World is to be commended for its effort in attempting to solve this problem by compiling and publishing [in the forthcoming statistical issue] useful information concerning the electric industry's expansion program.

C. E. Pichler
Comptroller
Southern California Edison Co
Los Angeles, California

• Thanks go to Southern California Edison and to the other 900 companies and systems that have returned data thus far.

Leased Wire Service

To the Editor:

Your October 29, 1951 issue of Electrical World carried a report of the October 18-19 meeting of the Pennsylvania Electric Association, including my announcement of a new service offer by our company of channels for remote metering, supervisory control, and miscellaneous signaling purposes, to be effective as of November 15, 1951.

The importance of this offer . . . is that it permits the electric utility company to subscribe for a single channel . . . and from this channel derive additional channels for metering, indicating, supervisory control, and other signaling purposes.

Ordinarily, when a talking channel is required, it is subscribed for separately and furnished . . . on a completely operative basis. However, if the channel is not required to be available continuously for talking, it may be used on an alternate basis for signaling and control purposes.

During such periods of alternate use, additional channels may be derived from it so that several of the metering, control, or supervisory functions can be handled simultaneously. Under no circumstances is it contemplated that the utility will attempt to use a telephone company channel simultaneously for talking and for the other purposes.

Robert M. Wachob
Assistant Vice President
Bell Telephone Co of Pennsylvania
Philadelphia

Appeal For Individualism

To the Editor:

I read your editorial in the November 19, 1951 Electrical World, page 85, on the menace of inflation. I read the copy my husband gets. Your remarks about government spending being an asset for inflation, summed up in the two points—unnecessary spending as government policy and pressure of money supply in the hands of people—are so outstanding that they are as mighty in power and light to warn any observer of what actual facts and conditions are as is a lightning stroke.

Having lived the past 2½ years in one of our government's projects, I've observed evils that would make other taxpayers shudder.

I'm from old American stock, and I know too much government is not what made this country. To the contrary, it was individualism.

Edna M. Gott
Cropsey, Ill.

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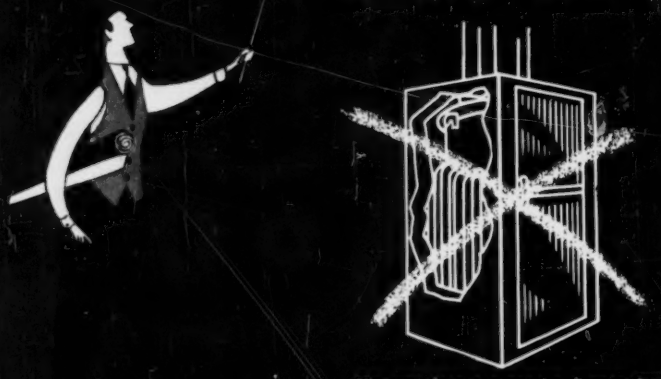
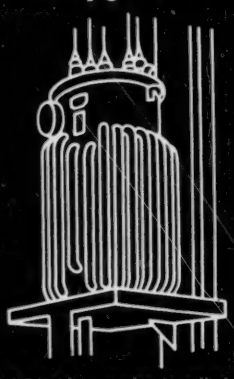
IT'S A FACT:

KUHLMAN SAF-T-KUHLS REQUIRE NO FIREPROOF VAULTS... BECAUSE THEY ARE 100% SAFE!



You can forget expensive fireproof vaults like this with Saf-T-Kuhls.



Saf-T-Kuhls may be installed anywhere in a plant with perfect safety.

Filled with an inert, non-inflammable, non-explosive cooling fluid, Kuhlman Saf-T-Kuhl transformers require no expensive fireproof vaults—may be installed without enclosures anywhere in a plant. Think of the savings this means in installation costs!

Because Saf-T-Kuhls may be installed anywhere—below floor level, at floor level, or up above other productive units near the ceiling—these units make it possible to utilize all available floor space for productive uses. And because they may be installed near load centers, Saf-T-Kuhls greatly improve voltage regulation and reduce power losses.

Saf-T-Kuhls are built with the care and craftsmanship typical of Kuhlman products for over half a century.

Write today for complete details on Kuhlman Saf-T-Kuhl transformers—ask for Bulletin CS-501.

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